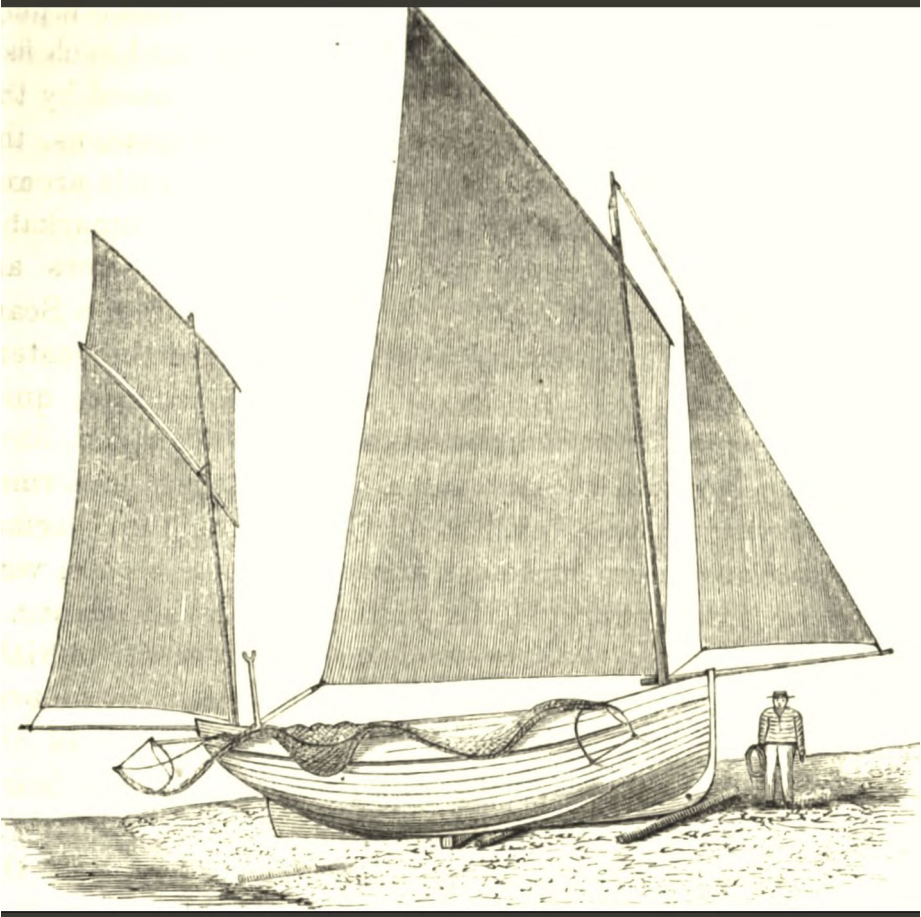

The sailing boat: a description of English and foreign boats

Henry Coleman Folkard

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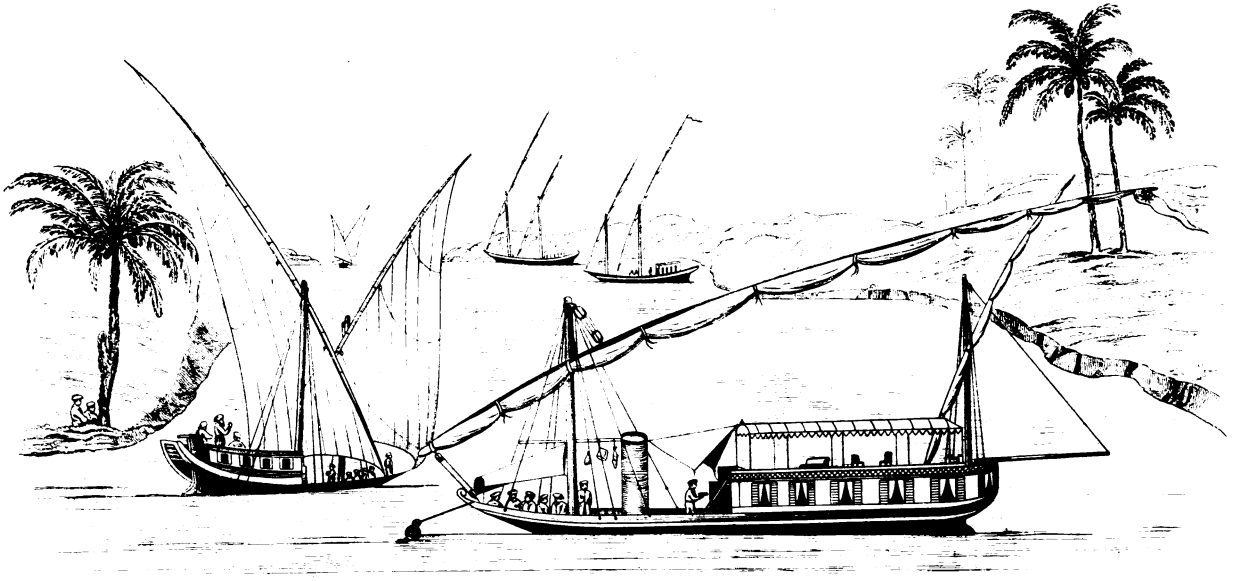

BOATS OF THE NILE.

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THE SAILING [illegible]

A [illegible]

[illegible] FOREIGN BOATS AND YACHTS

[illegible]

SAILING RULES OF THE VESSELS OF EVERY NATION;

[illegible]

SAILING [illegible] AND SEAMANSHIP

By H. C. [illegible]

FOURTH EDITION

LONDON:
LONGMANS, GREEN, AND CO.
1870

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THE SAILING BOAT:

A TREATISE ON

ENGLISH AND FOREIGN BOATS AND YACHTS;

Descriptive also of the various Forms and Peculiarities of

SAILS, RIG &c. OF THE VESSELS OF EVERY NATION;

WITH PRACTICAL DIRECTIONS FOR

SAILING AND MANAGEMENT.

By H. C. FOLKARD, Esq.

FOURTH EDITION.

LONDON:
LONGMANS, GREEN, AND CO.
1870.

231. f. 9

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PREFACE

TO

THE FOURTH EDITION.

ENCOURAGED by the success of previous Editions of this work, the Author has spared neither time nor expense to render the *fourth* Edition as complete as possible; and with that view he has made considerable additions to the work, not only in regard to new matter, but also in the number of Illustrations it contains. As regards the letter-press, the present Edition is nearly one-fourth larger than the previous one; and it contains more than double the amount of information comprised in the first Edition. It also contains about *a hundred and twenty* Illustrations, which is two-thirds more than the total number contained in the first Edition.

All the new, and most of the other, Plates and Engravings were made from original drawings by the Author. Many of the Foreign Boats and Vessels he sketched, with permission, from models in the Indian and United Service Museums; others from models, photographs, paintings, and drawings in his own and other private collections; a few only being copied from authentic works of voyages and travels.

Throughout the present work care has been taken to

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give accurate descriptions, as well as illustrations, of all the most curious and remarkable forms of vessels and sails that are met with in the various countries of the Universe. In the part relating to the sailing and management of English boats, but very few additions have been made, as that part of the work contains purely the result of the Author's observation and long practical experience in the sailing and management of boats; and was written entirely without reference to any other work.

In this Edition will also be found an Index, which, owing to the greatly increased number of subjects comprised in the Work, has now become indispensable.

LONDON:
July 12, 1870.

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THE SAILING BOAT.

PART I.

BOATS OF THE ANCIENTS.

'Illi robur et æs triplex
Circa pectus erat, qui fragilem truci
Commisit pelago ratem
Primus.'—Hor. *Od.* I. iii. 9.

The boats, or vessels, of the Ancients were of a very diminutive size in comparison with those of the present day. Few of them exceeded the ordinary dimensions of a modern ship's launch. But, as civilization advanced, boats and vessels of larger size were constructed, though in a rude and primitive style; and, when provided with vessels of burthen, it was a long time before the boldest mariners ventured to trust themselves and their vessels far from land.

The earliest mode of navigation was by rafts constructed of balks or planks of wood, to which were afterwards added borders of wicker-work, covered with skins or leather. Of this kind were the Coracle of Ancient Britain, and the *Cymba sutilis* of Virgil.

It is mentioned by Homer, that the boat built by Ulysses was put together with wooden pegs instead of bolts; (1) and that the gunwale was raised by hurdles of osiers to keep off the waves of the sea. (2)

The Egyptians had boats of *terra cotta*, and leaves of the papyrus; the Indians of bamboo, or similar cane from knot to knot, or of many pieces of rush. Skins of animals were

(1) Od. v. 249. (2) Ib. 256.

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used by the Romans and others for the outer covering of boats; and the Roman boatmen were called *Utricularii*.

The invention of ships was not known to the Romans until after the first Punic war, A.U.C. 490. (1)

To be represented in a boat was the Egyptian symbol of *apotheosis*; and many Emperors (as our Kings in a ship on their coins) are thus distinguished. (2)

The early Greeks are mentioned in history as the first who devoted attention to boat-building; the Trireme, Bireme, and other galleys were of their invention. The Trireme, which had three ranks or benches of rowers, was preceded by the Bireme with two ranks or benches; and the latter was a modification of the simple galley or long-ship, with only one rank on each side. (3) The bows of some of the war-galleys were ornamented with carved heads of boars and other ferocious animals, projecting four or five feet; beneath which, was a sharp iron pike or *rostrum*. It was in boats of this kind that the first naval action recorded in history was fought between the Greeks and their colonists, the inhabitants of Corfu.

The Romans afterwards improved upon the Trireme, and built a faster class of vessels, called the Liburni: these were more manageable than the others, and better adapted for sailing. The Liburnian galleys were in use at the beginning of the Roman Empire; and the naval engagement at Actium, in which Augustus Cæsar was victorious over Antony, was fought and won in Liburnian galleys.

An Etruscan boat has the prow turned up, stern flat and concave, with a hole in the side for the rudder. The latter is merely a long oar for steering. (4)

In most of the vessels of the ancients, it appears that the prow was made in the form of a fish, dolphin, or some animal, with the eyes very distinctly marked on both sides.

(1) Fosb. Encyclo. Antiq.

(2) Fosb. Encyclo. Antiq., Charnock's 'Marine Architecture,' &c.

(3) See 'Ships and Sailors, Ancient and Modern,' by C. C. Cotterill, B.A. and E. D. Little, B.A., 1868.

(4) Kirke, pl. 18.

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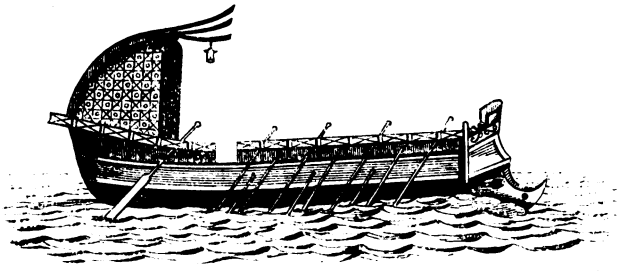

A Trireme, after Baïus, Schæffer, and others.

Vessels with oars preceded those with sails. Homer mentions masts, but not fixed, only put up as wanted.

As to rudders, some vessels had two, others four, two at the prow and two at the stern.

The ancient practice of rowing was as follows:—a director or boatman, called *Celeustes*, gave the signal for the rowers to pull, and encouraged them by his song or cry. This song, termed the *celeusma*, was either sung by the rowers, played upon instruments, or effected by striking a gong, after the manner of the Chinese, Japanese, and others at the present day. Ossian and others mention the rowing song:—

> 'And all the way to guide their chime,
> With falling oars they kept the time.'

The commander of the rowers, called *Hortator remigum*, *Pausarius*, and *Portisculus*, was placed among them in the middle of the boat. He carried a staff, with which he signalled by waving or otherwise when his voice could not be heard. The Anglo-Saxon, *batswan* (boatswain), also used a staff, wherewith to direct the rowers.

The Greeks had boats called *ampheres*; these were long and narrow, and were rowed by a single boatman only, with one pair of sculls. Rowing with the face to the prow is mentioned as customary with the ancients; but this may have

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been paddling, or pushing ahead with a paddle or sweeping pole.

The oar upon the Etruscan vases is in the form of a very narrow pyramid from top to bottom.

Baldarius was the inventor of oars, as applied to large fighting vessels. (1)

Masts and sails are said to have been invented by Dædalus. Varro says they were invented by Isis, who, with an affection bolder than usually falls to the lot of women, sailed in quest of her son Harpocrates: so that while her maternal fondness urged her to the completion of her wishes, she appears to have displayed to the world arts, till then, unknown to it. (2)

In Stosch and the Florentine Museum, is a small vessel with oars, the prow of which ends in a *cheniscus* of the form of a swan's neck: precisely in the place of a mast and mizzen sail, are two large extended wings, proper to catch the wind, as if for flying. This clearly explains the fable of Dædalus.

The cheniscus, or goose's-neck, was also, it appears, an ornament of the stern, but bent downwards towards the sea. (3)

The hull of the ancient galleys, as improved by the classical ancients, was made in conformation of the body of a duck, which was said to furnish the best model. (4)

The materials of which sails were anciently made were rushes, broom stuff, skins of animals, and the dried skins of the intestines of animals and fish; linen and hemp were afterwards used; indeed, from the time of Homer, linen was in use.

The forms of ancient sails were various—square, circular, crescent-shaped, and triangular, and the colours white, blue, purple, and sometimes curiously painted. According to Pliny,

(1) Aristoph. Ran. iv. 2. Rutil. Itin. i. 367. Pedian. ad Cicer. p. 37. Xenoph. l. 5. Polyb. i. 21. Strutt's Horda, 70. Kirke's Hamil. Vases, pl. 18. Evelyn's Mem. i. 196.

(2) 'Vela Isis rata primum suspendit, cum per mare Harpocratem filium audaci fœminea pietate perquireret: ita dum materna charitas suum desiderium festinat explere, mundi visa est ignota reserare.'—Lib. v.

(3) Fosb. Ency. Ant.

(4) See Pownall's Provincia Romana, pl. 3. f. 7.

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they were at first set one above another on the same mast; and afterwards on two masts, at the stern and prow.

The sails set on the stern or mizzen mast were called *epidromus*; those on the fore mast at the prow *dolones*; at the top of the mast *thoracium*; stun sails, called *orthiax*, were also used occasionally in very light winds. Sometimes when two or more masts were used, the sail of the main-mast was called *artemon*.

The topsails were of a triangular or *latine* shape, and were sometimes set with the apex downwards. (1)

It is clear that both sails and oars were employed in many of the vessels of the ancients. Winckelman, however, observes that ships disposed for battle had neither sails nor yards. (2)

The Boats and vessels of the classical ancients were of many kinds; with ten, twenty, thirty, and up to 100 oars. Those distinct from war service were as under:—(3)

Actuariæ naves—Long and light vessels, propelled both by oars and sails: never manned by less than twenty rowers.

Annotinæ Frumentariæ—Provision vessels.

Busse—A ship made like a wine-cask.

Calones—Boats for carrying wood.

Cercuri—Ships of burthen, both with sails and oars.

Celoces, or the Greek *Celetes*—Light vessels, used chiefly for piracy, with only two sets of oars, without deck or *rostra*.

Catascopia—Small despatch vessels, for carrying letters and reconnoitring.

Constratæ—Those which were entirely decked.

Cubiculatæ—Those with cabins and the conveniences of a house.

Dromones—Long boats, first used in rowing matches.

Fluviatiles—Boats of the river, as distinguished from those of the sea.

(1) Cotterill's 'Ships and Sailors, Ancient and Modern,' p. 10.

(2) See also Stosch. Mus. Flor. t. ii. pl. lx. xi. 5. Enc. Mon. Ined. ii. 280. Pliny, L. ii. 48.

(3) Vide Pollux. Aulus Gellius, x. 25. Liv. xliv. 28. Plaut. Fulgent. Enc. Plaut. Rud. iv. 2. 5. Nonn. xiii. 8.

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Gauli—Phœnician, and round for carriage.

Hippagines, or *Hippagogæ*—Transports for carrying horses and cavalry after the fleet.

Horiolæ—Small fishing boats.

Hornotinæ—Those built in a year.

Lenunculi—Small fishing boats.

Lentriæ. *Pontones fluviatiles*—Those employed exclusively upon rivers.

Lembus—Light and undecked, used chiefly on rivers, and on the sea by pirates.

Liburna, *Liburnica*—Light galliots, used both with sails and oars; from one to five ranks of rowers.

Lintres—Canoes made out of the trunk of a tree, and capable of carrying three persons.

Lintrarii—Boatmen.

Leves—Very light boats without decks.

Longæ Militares—Built to carry a large number of men, all with oars.

Lusoriæ—Pleasure boats and vessels, used by the guards of the boundaries of the empire in large rivers.

Myopara—A fly boat; a corsair's vessel.

Moneres Monocratæ—Modern galleys, and vessels with only one rank of oars.

Naves tabellariæ—Advice boats.

Navigiolum ad animum oblectandum—A pleasure boat.

Onerariæ—Ships of burthen, both with sails and oars.

Orariæ, *Littorariæ*, *Trabales*—Coasting vessels.

Oriæ—Wherries, and very small fishing boats.

Parunculus—A small bark.

Phaselus—A small vessel, with sails and oars.

Prosumia—A small watch boat.

Piscatoriæ—Fisher boats.

Pontones—Ferry boats of a square form for carrying horses and carriages.

Plicatiles—Portable boats, built of wood and leather, in such a manner as to be capable of being taken to pieces and carried over land.

Præcursoriæ—Boats which preceded the fleets.

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Piraticæ, *Prædatoriæ*, *Prædaticæ*.—Long, swift, and light boats, used by pirates or picaroons.

Serilla—Boats or barges stuffed in the chinks with tow.

Sagitta, *Saguntia*—A kind of galley.

Scapha—A long boat.

Solutiles—Boats which fell to pieces of themselves, such as those in which Nero exposed Agrippina.

Stationariæ—Those which were moored or remained fixed at anchor.

Sutiles—Made of strong staves, and covered with leather.

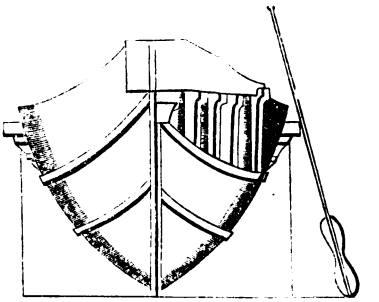
Stlatæ—Broader than high; used by pirates.

Trabariæ—Canoes (same as *Lintres*).

Thalamegus—A yacht or vessel of parade and pleasure.

To the above list a few others might be added from Rosinus; but as the definitions are doubtful and various, the author has extended it no farther.

The engraving below represents the elevations, head and stern, of a Roman galley, with oar or paddle; it is taken from a model presented many years ago to Greenwich Hospital by the late Lord Anson.



This model is one of the most reliable authorities that can be referred to; it is made from one in marble, which was found in the Villa Mathei during the sixteenth century, and now stands before the Church of Santa Maria in Rome.

The model is not a war-galley, but was probably used for commercial purposes, or for the transportation of warlike stores, provisions, and troops.

The Anglo-Saxons appear to have had *pleasure vessels*, if such be the proper meaning of *pleg-scip*, that is 'play-ship.' Some of these vessels are described as having ovens, fire-places, and other domestic conveniences; and boats covered with hides accompanied them.

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The large sailing ships of the Anglo-Saxons were often called *Carikes*. (1)

There were also *gallyetis*, (2) which were probably a small sort of galley.

They had also *Crayers*, or small fishing boats; and *Balingers*, small sailing vessels.

The Saxon ships of the eighth century were scarcely more than very large boats of the present day. Their prows and sterns were very erect, and stood high out of the water; and they were ornamented at the top with the rudely-carved head of some animal. They had but one mast, the top or head of which was also decorated with a bird, or some such device. To the mast was made fast a large sail, which from its nature and construction could only be available for the purpose of driving the vessel before the wind. (3)

The Saxons were very magnificent in the appearances of their royal vessels. King Athelstan had one (which was presented to him by Harold, King of Norway), the head of which was wrought with gold, the sails were purple, and the deck was elegantly gilt all round with gold. (4)

Both sails and oars were sometimes used in the galleys of the Normans.

An ancient author, who wrote a history of King Richard the First, in rhyme, says of the King:—

> 'Were the Maryners glad or wrothe,
> He made them seyle and rowe bothe,
> That the galley gede so swyfte,
> So doth the fowle by the lyfte.' (5)

Persons skilled in climbing the shrouds and rigging, were styled *funambuli*, as they were in the Classical Æra.

It is evident that canoes made out of the solid trunks of trees, by rounding them on the outside and hollowing them on the inside, were used by the Ancient Britons. Several of these

(1) Grafton's Chron., p. 571.
(2) Caxton in Polychronicon, p. 409, cap. 14.
(3) See Strutt's Horda.
(4) Strutt's Horda.
(5) MS. Harleian, 4690.

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have been dug out of the earth in various parts of England within the last century; some of them perfect in form, and in an excellent state of preservation.

It is stated in King's '*Munimenta Antiqua*,' that in a morass called Lockermoss, a very little distance from the Castle of Wardlaw, in Dumfries, an ancient canoe was dug up in the year 1736. This canoe was seven feet long, and dilated to a considerable breadth at one end: its paddle was found at the same time in the morass near to it.

Another canoe was found near Kiblain, eight feet eight inches in length, and two feet in breadth; having a cavity of six feet seven inches in length, and of eleven inches in depth, the hollow of which had plainly been formed originally by means of fire. (1)

In the year 1720, several canoes similar to the above were dug up in the marshes of the River Medway, above Maidstone; they were made of the trunks of trees hollowed on the inside: one of these was so perfectly preserved, that it was afterwards actually used as a boat for some time. (2)

On the draining of Martine Mere, or Marton Lake, in Lancashire, a few years ago, there were found sunk at the bottom eight canoes; each made of a single tree, which there is every reason to believe had been used by the Ancient Britons in fishing upon that lake, and which in size and shape were much like the American (Virginian) canoes. (3)

So also during the present century, on the draining of Whittlesea Mere, and in other parts of the Fen districts, canoes in a very good state of preservation have been excavated at a considerable depth from the surface.

(1) Pennant's Voyage to the Hebrides.
(2) King's Munimenta Antiqua, vol. i. p. 20.
(3) King's Munimenta Antiqua, vol. i. p. 29.

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BOATS OF THE ANCIENT EGYPTIANS.

It appears that among the ancient Egyptians, there were two classes of boat-builders,—carpenters and wicker-workers. The boats built by the latter were used chiefly for fowling and fishing; they were made of oziers, and bound together with bands taken from the stalks of the papyrus or cyperus. (1)

Boats made from the papyrus are frequently mentioned by ancient writers. Isis is described by Plutarch, as going in search of the body of Osiris, 'through the fenny country, in a bark made of the papyrus.' (2) But they were so small and light, as to be easily carried from place to place on a man's shoulders. (3)

They are also described by Strabo, (4) at the cataracts of Syene, passing the falls in perfect safety, to the astonishment of the beholders: and Celsius affirms, that they were made of the papyrus.

Theophrastus mentions boats made of papyrus, and their sails and ropes of the rind of the same. (5)

Pliny, also, speaks of boats woven of the papyrus, (6) the rind being made into sails, curtains, matting, and ropes: and he elsewhere observes, that the papyrus, the rush, and the reed, were all used for making boats, in Egypt. (7)

Vessels made of bulrushes, are mentioned in the Old Testament. (8)

The mode of binding and sewing boats with bands of the papyrus, are also alluded to by Lucan: 'Conseritur bibula Memphitis cymba papyro.' (9)

With these evidences before us, and those of the sculptures of Thebes and Memphis, there can be no doubt that boats were anciently made of the material *papyrus*; and employed in

(1) Vide Champollion's Monuments de l'Egypte. Also 'Manners and Customs of the Ancient Egyptians,' by Sir Gardner Wilkinson, F.R.S., M.R.S.L., &c. Third Edition. Vol. iii. A.D. 1847.

(2) Plut. de Is. s. 18. (3) Achilles Tatius, lib. iv. Plin. v. 9.

(4) Strabo, xvii. p. 562. (5) Theophr. iv. 9.

(6) 'Ex ipso quidem papyro navigia texunt.' Plin. xiii. 11.

(7) Plin. vi. 22, vii. 16. (8) Exod. ii. 3. Isaiah xvii. 2.

(9) Lucan iv. 136.

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various parts of Egypt, for fowling and fishing. Punts and canoes, made of oziers and papyrus, are still used on the Nile, and the lakes of Egypt.

The Egyptian 'boats of burden' were called *baris*; they are described by Herodotus as made of a thornwood, very similar to the lotus of Cyrene, from which a tear exudes, called gum. Of this tree they cut planks measuring about two cubits, and having arranged them like bricks, they built the boat in the following manner:—They fastened the planks around firm, long pegs; and after this, they stretched over the surface a series of girths, but without any ribs, and the whole was bound within by bands of papyrus. A single rudder was then put through the keel; and a mast of thorn wood, and sails of the papyrus (rind) completed the rigging.

Pliny speaks of papyrus vessels crossing the sea, and visiting the island of Taprobane (Ceylon). 'Quia papyraceis navibus armamentisque Nili peteretur (Taprobane).'(1) It may be, however, that he merely alludes to the sails of the vessels being made of the papyrus; for there is abundant evidence that the Egyptians had large boats of burthen, made of wooden planks.

Sir Gardner Wilkinson observes,—'We may be certain that the Egyptians had strong and well-built vessels for the purpose of trade, by sea; and for carrying merchandize, corn, and other heavy commodities, on the Nile: and that, even if they had been very bold and skilful navigators, they would not have ventured to India, nor have defeated the fleets of Phœnicia, in their paper vessels.'(2)

Mode of Navigation of the Vessels of the Nile.

Neither sails nor rudders were used with the canoes and punts of the ancient Egyptians: they were propelled with paddles, in deep water, and pushed ahead with a pole, in shallow water. But the absence of a sail in the canoes did not always depend on the size of the vessel; for it appears that many of their fishing canoes, some of which were very small, were frequently provided with a mast and sail.

(1) Plin. vi. 22.

(2) ...ers and Customs of the Ancient Egyptians,' vol. iii. p. 189.

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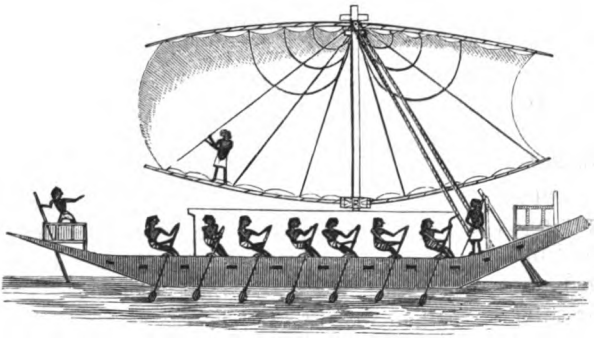

The pleasure boats of the ancient Egyptians were usually provided with two rudders, one on each side of the stern: the rudder consisted of a long broad paddle, of great strength; and the tiller, which formed part of the paddle, or rudder, was of enormous size, and supported by pillars or masts. The steersman moved the rudder by means of a rope fastened to the tiller head.

Other boats, though of large size, appear to have had but one rudder, and this was usually placed in a groove, or notch, in the centre of the stern.

The only kind of sail used by the ancient Egyptians appears to have been a sort of square-sail, with a yard both at the top and bottom.

The prow of the ancient Egyptian boats was generally decorated with a painted eye on each side of the stem; a peculiarity that has been kept up or adopted by the Chinese, through centuries, to the present day. The head and stern of the pleasure boats were generally ornamented with a painting, or carving of a richly coloured flower.

Most of the ancient Egyptian boats are shown with a man standing at the prow with a pole in his hand, wherewith to sound the depth of the water and signal to the helmsman when near a shoal, or sand-bank. The precaution of the sounding-pole is still adopted in all the Nile boats, wherever the pilot is doubtful about the depth of water. The war-galleys of the

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ancient Egyptians were also provided with a square-sail, but it differed from the rig of the pleasure boats, inasmuch as it had no lower yard; the sail was therefore easier furled or brailed up, by means of four separate furling-ropes, or brails, which, on being pulled, frapped the sail close to the upper yard, in four or five folds.

The square-sails were always guided or trimmed by braces, or guy-ropes, called *pedes*; these were attached to the extreme ends of the upper yard of the sails. Some of the boats were rigged with a sort of shear-mast, which consisted of two separate spars, placed wide apart below, but closing at the top, so as to leave sufficient space for the yard of the sail to be hoisted between them. The mast was secured by one fore stay and several back stays. None of the boats of the ancient Egyptians appear to have been fitted with more than one sail to each mast. When a single mast was used, it was very firmly fixed and secured; the foot of it to a strong beam, or step, which extended across the whole breadth of the floor; it was also supported by strong knees and lashings, and finally secured by stout stays and shrouds, leading from the mast head to the sides and stern of the boat; and it appears, that all these were necessary to compensate for the heavy yards and sail that were carried on the boat; and which, when hoisted and fairly set, were so considerably elevated, that the lower yard was fully six feet above the gunwales.

When they wished to furl or lower this sail, the upper yard was let down, whilst the lower one continued stationary; and in this position the sail was furled, and remained so until again required.

The yards consisted of two separate pieces, scarped and joined in the middle.

The sails of the grand pleasure-boats of the ancient Egyptians were sometimes painted with gaudy colours, and embroidered with fanciful devices: but these sails were made of cloth or linen, woven expressly for sails: the outer edges, or leeches of the sails, were strengthened with hems or borders, and sometimes with a small rope.(1)

(1) Vide 'Manners and Customs of the Ancient Egyptians,' by Sir Gardner Wilkinson, F.R.S., &c., 1847. 3rd edit. cap. IX.

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BOATS OF THE MODERN EGYPTIANS.

Nile Boats.

'Like a young Nile-bird, turn'd my boat
To the fair island, on whose shores,
Through leafy palms and sycamores,
Already shone the moving lights
Of pilgrims, hastening to the rites.'

T. Moore.

The Nile Boats of the present day, though still of a somewhat antiquated appearance as regards their form of hull, are well adapted for the navigation of that grand and interesting river. The lofty pointed *latine* sails which they carry, have a graceful and pretty effect, when viewed at a distance, as they bear their heavy burden along beneath the glorious prospect of an Eastern blue sky.

Some of the Passenger Nile Boats are from thirty to fifty tons burthen, and are very comfortably fitted for the pleasure and enjoyment of tourists: but they are not always so clean as they might be, on account of certain disagreeable little insects, and also equally disagreeable little animals, which are very prevalent in Egypt, and which sometimes infest the Nile boats. The only effectual way of getting rid of these nuisances is, by completely sinking the boat under water for an hour or two: a stipulation sometimes insisted on by travellers before closing a bargain for the hire of a Nile boat.

The various classes of boats of the Nile are:—

The *Djèrm* (Germ): the *Maádil*, *aggub* (Akkub): *Maash*, or *Rahleh*, *Dahabéëh*, *Cangia* (Kangeh): *Kyás* (Kyáseh): *Sándal*, *seféence*, *garib* (Kárib): and *Maadéëh*.[1]

Of these, the largest are the *Germs*, which are only employed on the Nile during the inundation, when the water is deep; or between Alexandria, Rosetta, and other ports on the Mediterranean. During the summer they are laid up and

(1) Vide 'Modern Egypt and Thebes,' by Sir Gardner Wilkinson, F.R.S., M.R.S.L., F.R.G.S., &c. &c. Vol. i. A.D. 1843.

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covered with matting, to protect them from the sun. These boats are enabled to carry a very large cargo of corn, in the transport of which they are chiefly engaged. They are rigged with two masts, large lateen sails, and a foresail or jib.

The *Maádil*, or as it is sometimes called, kyás, is a similar kind of vessel, but much smaller.

The *Aggub* is used exclusively for carrying stone, and is remarkable among the boats of the Nile for its peculiarity of rig; for, whilst all the other sailing boats are rigged with lateen sails, the Aggub carries a square sail.

The remaining five are small open boats.

Sándal implies a small sort of Cangia, or ship's boat.

The *Garib* is a fishing boat.

The *Maadéëh* is a ferry boat.

The *Maash*, *Dahabéëh*, and *Cangia*, are all passenger boats, and employed chiefly as such on the Nile; they are all furnished with cabins.

Of these, the Maash or Rahleh is the largest, and has the most lofty and commodious cabins.

The Dahabéëh and the Cangia are the favourite boats of English tourists, and in some respects they are similar in appearance. [For the engraving of Nile Boats see the Frontispiece.] The Dahabéëh is, however, the larger and more commodious of the two, and is furnished with a gangway on each side of the cabin, extending to the steerage. The modern Dahabéëh has also a rounded stern, which the Cangia has not. Both kinds are rigged with two masts and lateen sails, with lofty peaks to catch the wind from the high banks of the river when the water is low. In the Dahabéëh, the foresail is much the larger sail of the two, and is attached to a very long tapering yard, in some of the boats upwards of one hundred feet in length, thick at the lower end, but gradually diminishing to a slender substance at the peak, or upper end; at the extreme point of which the flag or streamer is hoisted. The mainmast, which is short and thick, is stepped in the fore part of the vessel, and the mizzen-mast at the stern, abaft the cabin and quarter-deck. The mizzen-sail is also a lateen, but not nearly so large and lofty as the mainsail. They set both sails

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on going up the Nile, when the wind is suitable; but on coming down, they stow away the mainsail and shift the mizzen-sail to the main-mast, and so drift steadily down with the current.

Some of the largest Dahabéëhs are nearly 100 feet in length, by only 14 in breadth. They have well-formed cabins and saloon at the stern.

A large water filterer, with a wooden frame, usually occupies the centre of the main-deck, and forms a prominent feature in that part of the boat.

The bulwarks are very low, scarcely six inches in height above the level of the deck.

The stern, or aft part, of all the Nile boats is much higher out of water than the fore part, and the rudders are, of necessity, very large and powerful.

The keel of the Nile boats is of concave form, being deepest at the stem and stern, whilst there is scarcely any keel at all amidships; the advantage of which is, that when they get aground forward, by putting the helm to port or starboard, the hollow part clears the bank, and enables the boat to get off immediately.

There is, among the naval models in the Kensington Museum, a beautiful model of a Dahabéëh, upon a large scale, with sails, rigging, &c., complete; it is, in fact, a model of a Nile boat recently built for His Highness the Viceroy of Egypt. It has a very sharp hollow bow, but is broad in the aft part, with a flat floor and shallow form of hull; and, like the other Nile boats, is low at the bows, and high at the stern, with cabin and gallery, after the manner represented in the engraving which forms the Frontispiece of this work.

A modern Dahabéëh (said to be one of the best on the Nile) is also described, in a recent work of great merit and interest,(1) as 97 feet in length from bow to stern, and 14 feet 2 inches in width. With a saloon measuring 12 feet 7 inches; divans on either side, with large drawers under them provided with locks and keys; two looking-glasses, bookshelves, and a table in the middle, at which six persons might dine 'under difficulties.'

(1) 'Four Months in a Dahabéëh,' by M. L. Carey, 1863.

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Besides which there were four cabins: two measuring 5 feet 8 inches by 4 feet 7 inches; the two others, 6 feet 5 inches by 4 feet 7 inches. They had also sliding doors; but when these were closed, the dimensions proved rather too small. The stern cabin measured 12 feet in length. There were plenty of windows all round, provided with curtains, shutters, and venetians; and a skylight to the saloon. Over all this was the quarter-deck, with divans on either side, a table, a chair or two, and an awning, which was spread in calm weather. The crew lived on the lower deck, and slept upon it or in the hold. At the further end was the large filter for the water, and the cook-boy's primitive kitchen apparatus for the crew. Beyond which, in the bow, was 'the kitchen' for 'the party.' The large mast and lateen yard was fixed towards the bow of the boat, the smaller one in the stern. Twelve oars were provided for rowing, and a number of long poles for pushing off from the sand-banks. The Dahabéëh, the oars, and the small row-boat were gaily painted in green, red, and white; and with the flags flying aloft, and the Arab costumes on board, the Dahabéëh 'Cairo' made altogether a very pretty 'turn out.' She numbered twenty-five souls on board—passengers five, dragoman and waiter, Reïs, steersman, fourteen men as crew, cook and boy. (1)

The Cangia, or Kangia, is about 30 feet long, with two masts and lateen sails, the larger of which is set amidships, and the smaller one in the bows. The rig is very picturesque in appearance, and admirably adapted to make the most of the wind. The sails require constant attention and nice management, or there is sometimes great risk of capsizing, by the sudden squalls which come down from the hills.

The aft part of the Kangia is occupied by a double cabin, with a narrow space between; the principal one opening on the deck, and prolonged, as it were, by means of an open verandah, under which it is pleasant to sit during the great heat of the day. There is also a bench on each side of the

(1) 'Four Months in a Dahabéëh,' by M. L. Carey, 1863, pp. 80 and 81.

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main cabin, which has windows with green blinds, that can be opened and shut at pleasure.(1)

The Sandal, which is a small kind of Cangia, is rigged with one mast only, and a lateen sail.

When they row the large Nile boats, such as the Dahabéëh and Cangia, they lift alternate planks from the deck, which are made to shift for the purpose; these they place on such as remain, and sit upon them, dropping their feet through the openings, and resting them on the timbers or cross-beams of the boat; and in such a position they are enabled to ply their long oars with considerable effect. When the wind is fair, the sails only are used; when it is foul, they are at once furled; but if the rowers do not use the oars, they commence 'tracking,' or towing the heavy vessel by means of a large rope, to which smaller ropes are attached and passed over the shoulders, one to each man. The progress is exceedingly slow, five miles a day being about the average. The boatmen never use the sails for tacking, as we do; they are too large and unwieldy for that purpose, and are occasionally dangerous if sudden gusts of wind catch them. (2)

If a squall arises, the sheets are let go; but it is not unusual for tables to be upset, and a complete smash to occur on board, in the midst of a calm, by a sudden gust from a gap or cliff.

The Nile boatmen are careless sailors, and much in the habit of making the mainsheet (shoghóol) fast: and to this, and the disproportionate size of the sails, may be attributed many of the accidents which occur to the smaller Nile boats. The passengers should insist on the boatmen holding the shoghóol in their hands, and keeping it *khálus*, i.e. free.

When a squall is observed approaching, the Egyptian pilot directs the attention of his crew to the halliards and brails, by the signal '*Arless! arless!*' which means, 'take care' or 'be ready;' it is then surprising to witness the alacrity of the boatmen, who are otherwise, often lazy and inactive, but, when aroused by warning of danger, just the reverse.

(1) 'The Nile Boat,' by W. H. Bartlett, 5th ed. 1862, p. 125.
(2) 'Up the Nile,' &c., by F. H. Fairholt, F.S.A., 1862, p. 81.

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Nevertheless, they make not the least objection to jumping into the water with their clothes on (they are not burthened with many) on any emergency, and swimming to the shore or to neighbouring boats. On returning to the boat, they take off their clothes and hang them up to dry.

The mode of furling the sails of the larger Nile boats is curious and exciting. Whilst peaked up high in the air, and swaying to and fro in the wind, the crew run up the mast and climb along the lofty yard with all the skill and agility of ancient *funambuli*; distributing themselves at equal distances apart from each other; and, in such positions, clinging to the yard, whilst they furl the sail with the neatness of English man-of-war men. In the large boats, sometimes as many as eight at a time are upon the main-yard furling the sail. The lightest youth goes first and highest up, to the slender part of the yard; the next lightest follow behind him, and so on, leaving the heaviest below, at the thick end of the yard and broadest part of the sail.

CATAMARANS, OR LOG-BOATS OF THE NILE.

'While far around like ruby sparks
Upon the water, lighted barks,
Of every form and kind—from those
That down Syene's cataract shoots,
To the grand, gilded barge, that rows
To tambour's beat and breath of flutes.'

T. Moore.

The primitive notion of crossing rivers on logs of buoyant wood is one that still prevails, even in countries where arts and sciences are liberally cultivated and broadly extended, and notwithstanding that boats and vessels of superior form and construction are daily before the eyes of those who are in the habit of using such rustic contrivances.

The Nile catamarans are simply thick logs of wood, about four or five feet in length, cut from the date tree, the fore end being sharpened a little to diminish the resistance to the

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water; sometimes two or three of the logs are lashed together, so as to form a more burthensome raft, for the purpose of carrying passengers and cargo across the river.

When a single log is used, the weight of the occupant is sometimes alone sufficient to sink it below the surface, although still maintaining buoyancy enough to keep the adventurer above water.

The manner of sitting and using the native catamarans on the Nile is remarkable, and requires considerable practice and no little skill. Some of the Nubian boys are very skilful in the management of them, and afford great amusement to the Nile-boat voyagers; they sit and lie upon their catamarans in various positions; sometimes at full length, on their stomachs, and yet propelling the log with undiminished speed, paddling across the bows of the passenger Nile boats, as if to mock their tardy progress; and all the while using nothing but their hands and legs to propel the log ahead. Sometimes they bind their bundles on the top of their heads and seat themselves astride the log-boat on crossing the river or shooting the rapids. Others sit upright, with their legs stretched out straight before them along the sides of the log; and then, with a balance-sweep or double-bladed oar, they draw or propel the raft ahead, by alternate strokes to right and left. In this way the Nubian inhabitants of Assouan, to this day, ferry themselves across the Nile to feed and look after their sheep and goats on the opposite shore; sometimes carrying bundles of fodder, in the shape of Indian corn leaves, and other provender, lashed to the catamaran with cords made from the fibres of the same date tree of which the floating log itself formed part. The Nubian boys perform very venturesome feats with these catamarans; riding upon them apparently without fear, as they shoot over the most perilous and roaring cataracts, choosing, as they do, for the sake of daring, the fiercest and most rapid parts of the torrent, to the astonishment and amusement of the Nile-boat voyagers, and all the while guiding their rolling barks and retaining their positions upon them with admirable skill.(1) Sometimes they appear totally

(1) See 'The Nile Boat,' by W. H. Bartlett, 1862, p. 208 (5th ed.).

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submerged, log and all, and apparently half drowned; but they never fail to come up again, and, with smiling faces, ask for that undying gratification, 'backsheesh.' (1)

Not very long ago some English ladies, on a voyage up the Nile from Assouan to Korosko, were delighted with the sight of what they at first supposed to be a veritable little mermaid, floundering upon the surface of the water in most interesting attitudes. On nearing the figure, however, they soon discovered that it was a small human form, in the shape of a pretty little girl, about ten years of age, with a rich copper-coloured skin, lying stretched on the surface of the water, perfectly naked, with a submerged log beneath her, and moving quickly along by means only of her hands and feet; she was making her way across the river, with apparent ease and confidence on her log-boat, although it was buried under water as she laid along it flat upon her chest, her hands and feet working away upon the surface. Like her father, who was near by on a similar raft, she was taking fodder across the river, consisting of a bundle of bright green leaves, which she carried in front of her upon the raft. Her laughing face was the picture of innocence and happiness, as she worked her way across the stream; and notwithstanding that the current was very strong, she was not to be baffled, and came alongside the travellers' Dahabéëh, when, with irresistible grace and innocence, she held out her palm for a few 'parras' (copper coin of the country). (2)

This mode of crossing the Nile is said to be common near Assouan, where many log-boats may be seen lying on the rocks to dry. Some are larger than others, and made of two or three logs bound together; these will carry five or six persons across at a time, although how to seat them all upon so small a surface would puzzle most European brains.

(1) See 'The Nile and its Banks,' by Rev. Alfred Charles Smith, 1868. Vol. ii. p. 11.

(2) 'Four Months in a Dahabéëh,' by M. L. Carey, 1863, p. 174.

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THE CORACLE.

'We dared to think, we dared to say, that he could frame a boat,
And many others said the same, but questioned—"would it float?"'
ELIZA COOK.

HISTORY informs us that the coracle is one of the earliest forms of boat ever constructed in Great Britain. One of the most curious circumstances connected with the study of British boat-building is, that, at the present day, boats (i.e. coracles) are carefully made and constantly used, in parts of England, Wales, and Ireland, almost identical in size, form, construction, and materials, with those in use nearly nineteen centuries ago. And, however mean and insignificant the contrivance of the coracle may appear in the great yards of British boat-builders, and on the wide world of waters, it is a stubborn fact that the coracle is now, as it was then, fully adequate to the purpose for which it was intended.

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We are told that some of the coracles of the ancients, composed of two hides and a half, were large enough to contain three men, with a week's provisions; others were large enough only for an armed man and a rower.

As coracles of this construction are mentioned by Herodotus, the pattern was probably derived from the Phœnicians, particularly as Sidonian and Phœnician vessels were almost round in form.(1)

It is evident that coracles were known and used by the Saxons, for Sidonius Apollinaris (a Gaulish bishop of the fifth century), writes—'The Saxon corsair, whose pastime it is to plough the British sea in a boat made of skins and stitched together.'

In the time of Henry V., light boats, framed with wicker or thin timber, and covered outside with leather, were carried by ship to the wars, to enable the soldiers to pass the waters which might be in their way on their marches. Such were also the *Naisselles* carried over to France in the wars by Edward III.(2) These were artfully made with prepared or boiled leather,(3) and would each hold three men therein to fish or take their pleasure.

Hollingshed also alludes to Henry V. making great preparations for the war, on his second expedition into France, by providing 'boats covered with leather to pass over rivers.'

Lucan, in describing the boats of the Ancient Britons, says they were made of osiers twisted and interwoven with each other, which were covered over with strong hides.(4)

> 'With twisted osiers the first boats were made,
> O'er which the skins of slaughter'd beasts were laid:
> With these the Britons on the oceans row,
> And the Venetians on the swelling Po.'

Pliny speaks of voyages of six days' sailing being performed

(1) Gauli, p. 318.
(2) Froissart's Chron. vol. ii.
(3) 'Faittees et ordonnees sy soubtillement de cuir boully.'
(4) Vide also Strutt's Horda, vol. i. Also Cæsar de Bello Civ. lib. i. s. 54.

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in 'vessels covered with leather round about, and well sewed. (1)

And he also speaks of certain wicker boats being met with on the 'British Ocean,' made of twigs, covered with leather, and stitched round about. (2)

Strabo mentions a kind of boat, called *pêcton*, apparently similar to the coracle; he describes it as 'made of thongs, so as to resemble wicker-work.' (3)

Coracles are as much in use as ever in South Wales, on the rivers Wye, Usk, Towey, and other favourite resorts of anglers and fishers; and so also on the western coast and inland waters of Ireland; and they are just the same sort of vessels as those in which the ancient Britons used to cross the seas and brave the storms of the Irish and English Channels eighteen hundred years ago. The native fishermen and boatmen of the north and western coasts of Ireland still express their entire confidence in the sea-going qualities of their coracles, and prefer them in bad weather to any other kind of boat.

The English peasants term these interesting little vessels 'cruckles.' In Hereford and Monmouth they are called 'thoracles,' and 'truckles;' and on the western coast of Ireland, 'curraghs,' 'corraghs,' or 'corachs.' The original term is supposed to have been coriacle; and if so, was probably derived from the Latin *corium*, a skin or hide, or *coriago*, hide bound.

The engraving at page 22 represents a modern coracle of the river Wye, in South Wales; and explains the manner in which they are carried by the fishers and others in that locality.

In shape, the Welsh coracle is something like the half of a walnut-shell; but they vary a little in form, in different counties, and so also as to the material of which they are composed. But the framework, or main fabric of the coracle, is

(1) 'Ad eam Britannos vitilibus navigiis corio circumsutis navigare.' Plin. Nat. Hist. Lib. iv. cap. 14.

(2) 'Etiam nunc in Britannico oceano vitiles corio circumsutæ fiunt.' Plin. Book vii. cap. 56, sec. 57.

(3) Strabo, xvii. p. 562.

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now (as it has always been) composed of wicker or basket-work: inside the wicker-work is a skeleton of laths, or flexible sticks, laid crosswise; and the outside of the wicker-work is covered with canvas. Of late years it appears that zinc (1) has sometimes been used for the outer covering.

In Cardiganshire the framework is covered with flannel, and dressed with tar. In the neighbourhood of Shrewsbury they are covered with canvas and painted. Some of the most fragile are merely covered with white linen, and dressed over with resin, varnish, and other compound. The most durable are coated with hides or skins, and such is the material of which the ancient ones were made; tarpaulin, and other water-proof material, is now the more general article used; and the framework is, besides, dressed over with pitch and tar, within and without, so as to make them perfectly water-tight.

There is no lighter nor more portable and inexpensive kind of boat ever made than the coracle: their average weight is about twelve pounds. The fishermen of the Wye, and of the west and north of Ireland, usually make their own; but the cost of one of the small coracles of the best kind, in Wales, is only twenty or twenty-five shillings. A light plank, or strip of board, is placed across the middle of the coracle, so as to form a seat for the occupant, who, with a small paddle, directs its movements.

The common size of the coracle is from three and a half to four feet wide, by two feet deep, and less than six feet long.

If the coracle gets pierced or injured by coming in contact with a stake or sharp stone, it may be quickly repaired with a bit of cloth or rag, and a daub of warm pitch.

The coracle is a great acquisition to the salmon-fisher, who pursues his vocation in different rivers and pools of water: the chief advantage being, that he may carry his boat on his back by means of a leather strap slung across the shoulders, and so pass from place to place, though miles apart; thereby placing himself in a perfectly independent position as

(1) See 'The Book of South Wales, the Wye and the Coast,' by Mr. and Mrs. S. C. Hall, 1861, p. 33.

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regards horses, ferrymen, and even umbrella. When fishing from the coracle at mid-stream, if a large fish be hooked, the coracle is sometimes spun round as if on a pivot, and dragged a considerable distance, unless checked by the fisherman with his paddle.

The smaller-sized coracles are a dangerous and fragile kind of bark in which to venture far from land, and considerable practice is necessary in order to enable a man to balance himself inside with safety; great caution and some little skill are also required in getting in and out—a slight lurch on either side will generally roll it over. The position in which a man sits is facing the stem or fore part; when, by means of a single paddle (though sometimes a double one, called a *sweep*, having a blade at each end), the coracle is rapidly propelled through the water. The sweep is held firmly with both hands in the middle, about one foot apart, and flourished after the manner of a see-saw movement; dipping each blade in the water alternately, thereby drawing or 'sweeping' the coracle ahead. When well practised, it is astonishing with what rapidity the coracle may be made to skim the waters. This, however, is more generally the mode of propelling the larger ones. The smaller ones are navigated with a single-bladed paddle, the top of the handle of which the coracler places against his shoulder, and works it with his left hand, whilst holding his fishing-rod with the right. Slow progress only can be made with the single-bladed paddle; the sweep is the instrument to drive them ahead rapidly.

At the annual regatta at Monmouth, the coracle race is usually one of the most amusing and attractive matches of the day; and before it is concluded, at least half of the competitors are capsized in the scramble for pride of place.

Within the last forty or fifty years the modern Irish curragh has, to a certain extent, superseded the ancient Celtic coracle. The difference, however, is chiefly in the material of which the outer covering is composed: strained canvas, coated with tar, being used in preference to horse-hide, as less liable to stretch when exposed to sea-water, and also as a far less costly material than leather.

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Modern Irish Curragh.

The modern curragh is also of an improved shape, being considerably longer, and of a form better adapted for the open coast than the English coracle; but in all other respects the curragh is precisely the same as the coracle of the ancient Britons.

Irish curraghs are from fifteen to twenty feet in length, by two and a half, and three, in breadth; they are so light that they are carried to and fro by the fishermen, from the coast to their cottages, almost daily. But, notwithstanding their lightness, against a heavy sea and wind they are said to possess great superiority over boats built of wood. They are, however, only suited for fishing with hook and line, by reason of their light and fragile nature.

These curraghs are used for fishing in the Atlantic on the iron-bound coast of the west and north of Ireland; they are neatly and beautifully made, buoyant and light as cork, and are a credit to the native industry and ingenuity of the Irish people. In shape, on the inside, they are like a long light galley; but they have a bold, high bow, which, on the outside and under part, resembles the bow and bottom of a Norway praam. They have a flat-shaped floor, but no keel; they are round-bottomed, and made mainly of wicker-work, similar to that of the Welsh coracle. The upper part of the curragh, from the thwarts to the gunwale, on the inside, is composed of wood; but all the bilge and bottom parts of the wicker-work are lined with a light trellis framework of wood. The outside of the curragh is entirely covered with tarred canvas, strained tightly over the wicker-work.

These curraghs are each fitted with four thwarts, which are fixed at equal distances apart; but there is no thwart of any kind either in the stern or the bow, it being important in a sea-way to keep both ends of the curragh light, and free of

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any dead weight. There is also a fifth thwart, which is placed just forward of the fore-thwart, and is pierced for a small mast: this thwart is fixed lower than the others, and is, in fact, but a few inches above the bottom of the boat.

When going before the wind, a light lug-sail is sometimes set; and though apparently unsteady and unsafe under sail, these curraghs, when managed skilfully under oars, are said to be capable of living in a heavier sea than any other open boat, by reason of their extraordinary buoyancy.

They are usually manned by four persons; in fact, the curraghs above described are constructed to carry that number as their complement, each of whom plies a pair of short oars or sculls, as occasion requires.

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PART II.

ENGLISH SAILING-BOATS, YACHTS, ETC.

'The breeze fills my sails, so adieu to the land!
My ensign's unfurl'd, I've the helm at my hand.
What sport is more pure, what pleasure more sweet,
Than the sail and the breeze when kindly they meet.'

THE AUTHOR.

THERE is considerable variety in English sailing-boats, both as regards form and rig; and although some possess fewer general advantages than others, it is often found that the nature of the coast in some parts—the harbour, river, or other circumstances—renders it necessary that a boat of a different, and in some places peculiar, form and rig, should be adopted for the purposes of safe and useful navigation. And a sailing boat, to be safe and serviceable, must be adapted to the waters and locality in which it is to be employed; the most useful and reliable being that in most general use by the resident boatmen, the form and rig of which will usually be found to possess some special advantages with reference to the nature of the waters and coast to which it belongs; and generally such advantages or peculiarities are the result of years of practical experience, by those familiar with the navigation and locality of the waters.

A boat constructed and rigged for sailing on the smooth surface of inland waters would be ill suited to the rough waters of a sea-coast, and *vice versâ*. And, as some parts of the coast are much more dangerous than others, it is found that the ingenuity of the native boatmen has enabled them, from long experience, to design a form of boat admirably suited to the locality and purposes required. For instance, the north-country cobles, employed off the perilous north-east coast at Flamborough Head, and such-like exposed parts, are

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ingeniously contrived to meet the dangers of the navigation of that bold and stormy coast; but they would be ill adapted to the shallow waters of an inland bay or a narrow river. So also as to the yawls employed on and off the coast of Yarmouth and the neighbourhood, which abounds with shoals, shallows, and sands. The feats of seamanship and daring constantly performed in both, by the native boatmen, are truly astonishing; whilst in boats of an ordinary form, it would be certain destruction to attempt such.

Sailing-boats for sea-going purposes must have high bows, and the ballast should be trimmed rather farther aft than in such as are employed in smooth water. It is also better for small sea-going boats to be so rigged as to carry a mizzen-sail, which is of great assistance on 'coming about' in a sea-way.

Boats employed in the pilot service, which have constantly to be run up, under sail, alongside of vessels at sea, for the purpose of putting a pilot aboard, are rigged with a view to the convenience and facilities of that service, and generally carry all their sail inboard; some, however, have a mizzen, the clew of which is run out on an outrigger at the stern, but they seldom carry any sail extending beyond the stem of the boat, nor indeed any bowsprit, because of the peril of snapping it off, or of its becoming entangled with the ship in a rolling sea. The main-mast of a pilot lugger is therefore placed forward, in the bows of the boat. (See the engraving which faces this page.) With boats so rigged, pilots fearlessly luff up to leeward alongside ships at sea, deliver a pilot, and bear away again without striking sail or lowering any of their canvas. Pilot boats, however, are not all rigged as luggers; there are various other rigs for pilot boats, as schooners, cutters, sloops, &c.

River boats for sailing should not be less than fifteen feet in length, by at least five in breadth: they should be sharp and fine at the bows, broad a-midships, and by no means narrow at the stern. Inexperienced persons are warned against the danger of setting sail in small boats of a narrow form of hull; such boats, though well suited to the oar, are unsafe with a sail.

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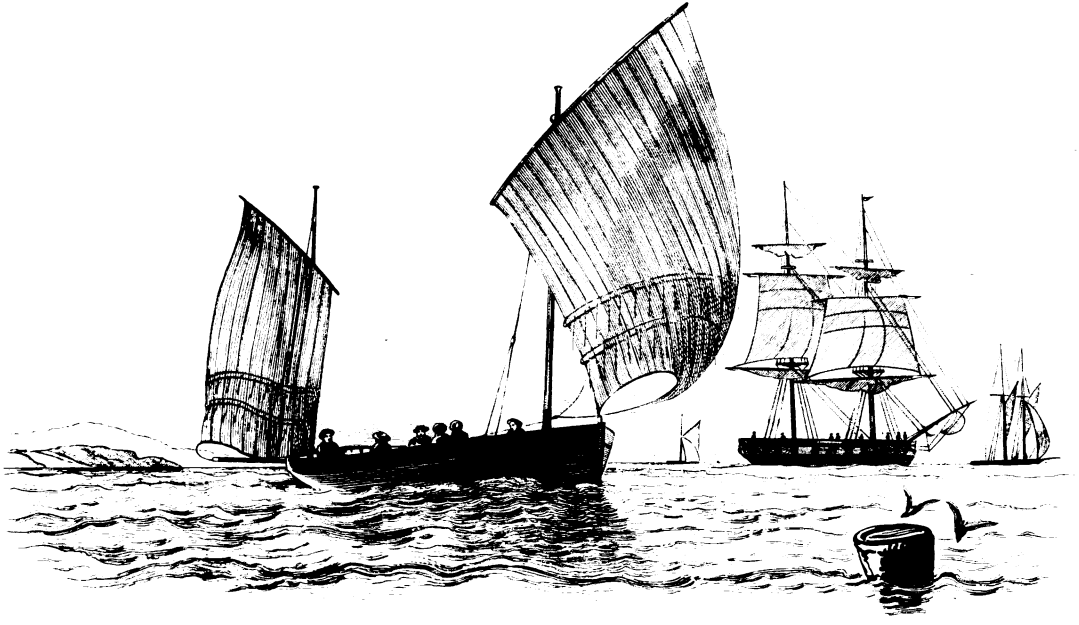

PILOT LUGGER.

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Boats with narrow sterns are not desirable for sailing; those with tolerably broad sterns and good breadth of beam, are enabled to carry sail with far greater safety than those with wedge-like bottoms and narrow beam.

Short, wide boats are the safest and swiftest for beating to windward in tortuous rivers and narrow channels.

Long boats are best adapted for wide waters, sailing on a bowline, and running free; and generally, in places where long tacks may be made.

Boats with a narrow deck, or water-way within the gunwales and around the interior, are called 'half-decked boats,' the object of the water-way being, to render them safer under sail, when listing over in a breeze. All open boats with large sails should be so furnished. The half-deck or water-ridge is a great safe-guard, as well as convenience and comfort; it also makes the sailing-boat more complete; but notwithstanding, if too much sail be set, and the sailor too venturesome, the half-decked boat is equally liable to be upset and sunk.

The Sprit-sail and Fore-sail Rig.

For small open sailing-boats, there is no better, safer, nor more convenient rig than the sprit-sail (or spreet-sail), and fore-sail. There is no sail which stands flatter than a well set sprit-sail; and it has the merit, when old and out of shape, of standing as well as ever. To a tyro boat-sailor it is recommended as superior to any other, for a boat under eighteen feet in length; when longer, some other rig is preferable, as the spreet required to set the sail will be found too long and heavy to be convenient, and it is besides, in many respects, dangerous. Should it suddenly or accidentally slip out of the strop or snorter which holds the lower end to the mast, it would strike the bilge or some other part so violently as to go through the side, and probably stave the boat and sink it on the spot.

The sprit-sail, in shape, resembles a cutter's mainsail, but has a sharper peak, which is raised by means of a small spar

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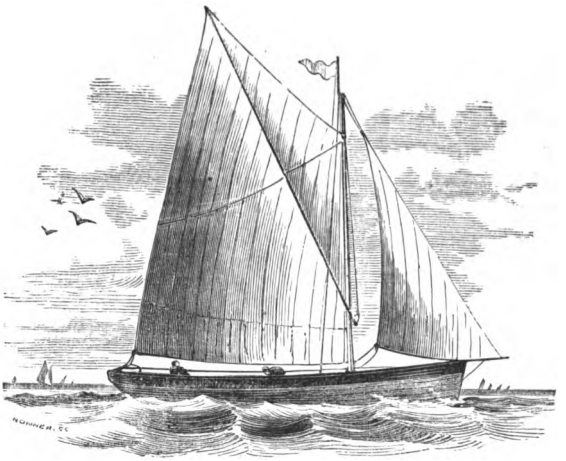

The Sprit-sail and Fore-sail rig.

called a *spreet*, the heel of which is set in a selvagee strop, or a grommet formed into a snorter, which encircles the lower part of the mast; the top of the spreet is set in the peak-eye of the sail, and so the whole is spread.

The usual sized sailing skiff is about fifteen or sixteen feet in length; such a boat should have an iron bumkin, about a foot long, or a short wooden bowsprit, fitted to the stem. As to the mast, a short one will suffice, as a good deal of the strain or pressure of the mainsail is taken from the top of the mast by the spreet, and the pressure is thereby thrown upon the lower part of the mast. No boom need be used for the sprit-sail.

The fore-sail should have a stout rope attached to the fore-leech, which will answer the purpose of fore-stay; a single small rope on each side of the mast, and made fast inside the boat, will be sufficient for shrouds; but the boat will sail better and be safer without them.

The sprit-sail must be fitted with brails, wherewith to furl it at any moment and on any emergency; the brails should be so fitted as to catch the sail under the throat, or about mid-way

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on the outer leech; so that, on the brail-rope being pulled, the sail is readily furled. The brails should at all times be kept clear and ready for use, in order that the sail may be frapped up instantly when required. One great and dangerous error prevails with some persons who use this kind of sail: it is in setting the spreet, the error being in shipping it *between* the sail and the brails, so that spreet and sail are both brailed up close to the mast when the rope is hauled taut; but such is as unsafe as it is erroneous. The spreet should always be set *outside* the brails, by which means the sail may be drawn closer to the mast, and much quicker and easier; the loose flapping at the top part of the sail is also avoided, whilst the spreet, instead of being drawn up, as it would be if within the brails, remains in its proper position.

The advantages of the plan recommended need only to be tested to be appreciated. An instance came under my notice of a boat being upset solely from the spreet having been set within the brails. On the occasion alluded to, a heavy squall was observed approaching, and the brails were hauled taut to prevent an accident; but still the top of the sail was flapping about and filling with wind; besides which, the whole weight of the spreet was thus unavoidably thrown on the upper part of the mast, and even higher, by the lofty flapping peak; the consequence was, that when the squall struck the flapping sail, the upper pressure capsized the boat. Now, had the spreet been outside the brails, the flapping of the peak would have been avoided, and the spreet would have stood in the same position as if all sail was set; consequently, when the squall struck the boat, the whole pressure would have been thrown on the *lower* part of the mast, and not on the upper, as in the case of the accident alluded to.

On reefing the sprit-sail the selvagee or grommet must be slipped a little lower down the mast, which will bring the spreet lower, and generally admit of one reef; but when two or more reefs are necessary, and the heel of the spreet cannot be got down low enough, the top end must be taken out, and the eye of the peak lashed securely to the spreet, about a foot or so from the top; this mode of 'reefing the spreet' will have

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rather an unsightly appearance, the top of the spreet projecting a foot or two beyond the peak; but it is better than the two other alternatives, the one of spoiling the spar by cutting it shorter, and the other incurring the danger of carrying the sail too high. It is advisable, however, to carry an extra spreet, of shorter length, when reefing is anticipated; but the sprit-sail should always be so made as to allow of the sail being close-reefed with one and the same spreet standing, and without unshipping, or taking it out of the selvagee.

Another and more ingenious method of reefing the sprit-sail, is that by which the necessity of slipping the spreet through the eye of the peak sufficiently to enable a long sprit to be used with a reefed sail is avoided. The plan consists in providing a spreet with a short sprit-end, or rather a spreet in two parts; the lower part having a shoe of copper-tube, with a short sprit-end, so that the latter may be shipped on or taken off from the spreet without lowering or disarranging the peak. By this plan, when the sail is reefed, the upper part only of the spreet is required, which is, in fact, a complete short spreet; but when the reefs are shaken out, and the whole of the sail is required to be spread, then the lower or tubular end of the spreet is shipped on, and you have a long spreet at once. Such is undoubtedly a very expeditious mode of setting up the sprit-sail on shaking out the reefs, and so also on shortening sail, as the lower end of the sprit may be as quickly unshipped without disturbing the peak.

On setting the sprit-sail, the boat should always lay *head to wind*, and the same on shortening or taking in sail. It will be found a difficult task (in fact, almost impossible with a tolerably large sail) to set the spreet with a fresh breeze *abaft*.

The following are suitable *dimensions for a suit of sails* (*sprit-sail and fore-sail*) for a small open sailing-boat, or skiff, fifteen feet in length, by five feet six inches in breadth.

Hoist of mainsail	7 ft.	6 in.	Length of spreet	16 ft.	0 in.
Head ,,	8 ,,	3 ,,	Fore-sail luff	10 ,,	6 ,
Aft leech ,,	12 ,,	0 ,,	,, aft leech	7 ,,	10 ,,
Flap (or foot) of mainsail	9 ,,	0 ,,	,, foot	5 ,,	9 ,,

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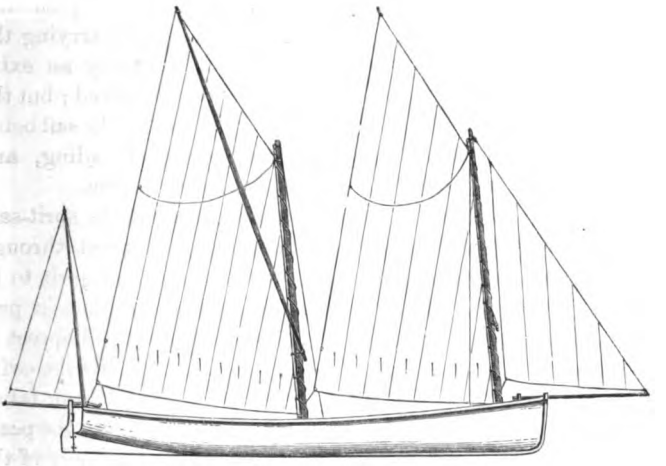

THREE-MASTED SPRIT-SAIL BOAT.

The three-masted sprit-sail rig is a very pretty and useful one for a small narrow boat, about eighteen or twenty feet in length, by four or five feet beam.

The rig consists of four sails, viz. three sprit-sails and a jib; or it may be two sprit-sails, jib, and Bermudian mizzen (as in the above engraving).

The main-mast should be stepped amidships, the fore-mast well forward, and the mizzen-mast at the extreme end of the stern.

Open boats, so rigged, are very handy under sail; and they may be sailed under various changes as regards shortening and dispensing with one or more of the sails in strong winds. The rig is also useful for a boat used for mackerel and other kinds of sea fishing; it stays well in a sea-way, and has, besides, many advantages as a safe and handy rig for a fast-sailing boat.

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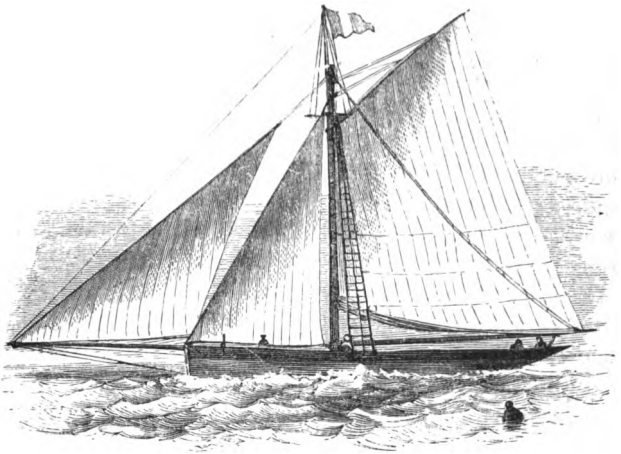

THE CUTTER.

THE engraving represents a cutter yacht in a strong breeze, with her top-mast housed, and main-tack triced up. No form of rig is so much in favour among English yachtsmen, and for small vessels generally, as the cutter rig; and none is better known and admired. Cutter yachts are more numerous, and have achieved more victories in sailing matches, than any other class of vessels in the world; they are also employed by the English Government in the revenue service, as the most useful and convenient rig for the navigation of the English Channel, where short seas and broken waters prevail; and as the swiftest kind of vessel for chasing smugglers, and preventing the landing of contraband goods. The cutter may, therefore, be considered as possessing many and great advantages for fast sailing. The rig comprises four sails—mainsail, fore-sail, jib, and gaff-topsail. The mainsail is spread by means of a gaff and boom; the outer end of the latter generally extends some little way over the stern; the fore-leech of the fore-sail is attached to the fore-stay by means of brass thimbles

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or a lacing of ratline; the jib is run out upon the bowsprit. Cutters carry a long bowsprit, which is fitted so that it can be reefed or taken in entirely, or according to the size of the jib that is used.

The cutter rig is suitable for boats of any size, and for small vessels up to sixty or eighty tons; beyond that size the schooner rig is preferred, as being lighter, and one that can be more safely handled in a sea-way. The boom and other spars required for a larger cutter being found very heavy, and sometimes dangerous and difficult to reef and manage in strong winds and heavy seas.

There are, however, among the pleasure squadron, a few cutter yachts up to, and even above, one hundred tons. But when at sea in bad weather they usually unship their heavy boom and gaff, and use a trysail or smaller sail in the place of the large mainsail.

The following may be relied on as suitable dimensions for a cutter-rigged sailing boat, half-decked or provided with one-foot water-ways inside the gunwale on both sides of the boat.

Dimensions of Boat.		*Length of Spars.*	
Length over all	20 ft.	Mast	19 feet 6 inches
Breadth amidships	6 „	Boom	14 „ 6 „
Depth	3 „	Gaff	8 „ 10 „
Length of keel	17 „	Bowsprit	14 „ (in all)

Dimensions of Sails.

Mainsail luff	12 ft. 0 in.	Fore-sail luff	12 ft. 0 in.
„ aft leech	17 „ 0 „	„ foot	6 „ 0 „
„ head	8 „ 8 „	Jib luff	15 „ 0 „
„ foot	14 „ 0 „	„ foot	9 „ 0 „

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SLOOP-RIGGED SAILING BOATS.

THE sloop (anciently shaloop), an old-fashioned, but most useful rig, resembles the cutter in some respects; the mainsail is, in fact, precisely the same, but the fore-sail is set on a fore-stay, which is attached to the outer end of a standing bowsprit; if a jib be used, a jib-boom becomes necessary. The fore-sail is generally large; and for fast sailing, the lower leech or flap should be laced to a boom. The sloop rig was, until recently, chiefly confined to boats and small trading vessels; but since the Americans have improved upon it, and turned out several very decided clippers rigged as sloops, it has become rather a favourite rig for English pleasure boats, and small yachts. (See the Wild-fowl Shooting Boat, at page 101, which is sloop rigged.) A boat with a long sharp bow is desirable for the sloop rig.

Some of the New York sloops are the fastest boats in America, beating even their famous schooner-rigged pilot boats. The difference between the rig of the English cutter and the New York sloop is, that the mast of the latter is stepped farther forward, and they have a larger mainsail, which is laced to the boom; and they carry a stay-sail (also laced to a boom) in the place of our cutter's fore-sail and jib. The keel of the New York sloop is very deep aft, but at the bow it has very little hold of the water. The smaller of the American sloops are very broad and shallow, but these are fitted with a centre-board keel; (1) and the mast is placed as far forward as possible—in fact, close to the stem. (See engraving of centre-board boat sloop-rigged, *post*, p. 86.)

In the American sloop yachts (as in their schooners), the mainsail is laced to the boom with reef-knittles, and cut in a scientific manner, so that it stands very flat, and no leech below the boom can be gathered. The fore-sail, instead of being reefed as in English cutters, is made with a bonnet, and so cut as to stand quite flat when laced to a small boom.

(1) See *post*, 'Centre-board' boats.

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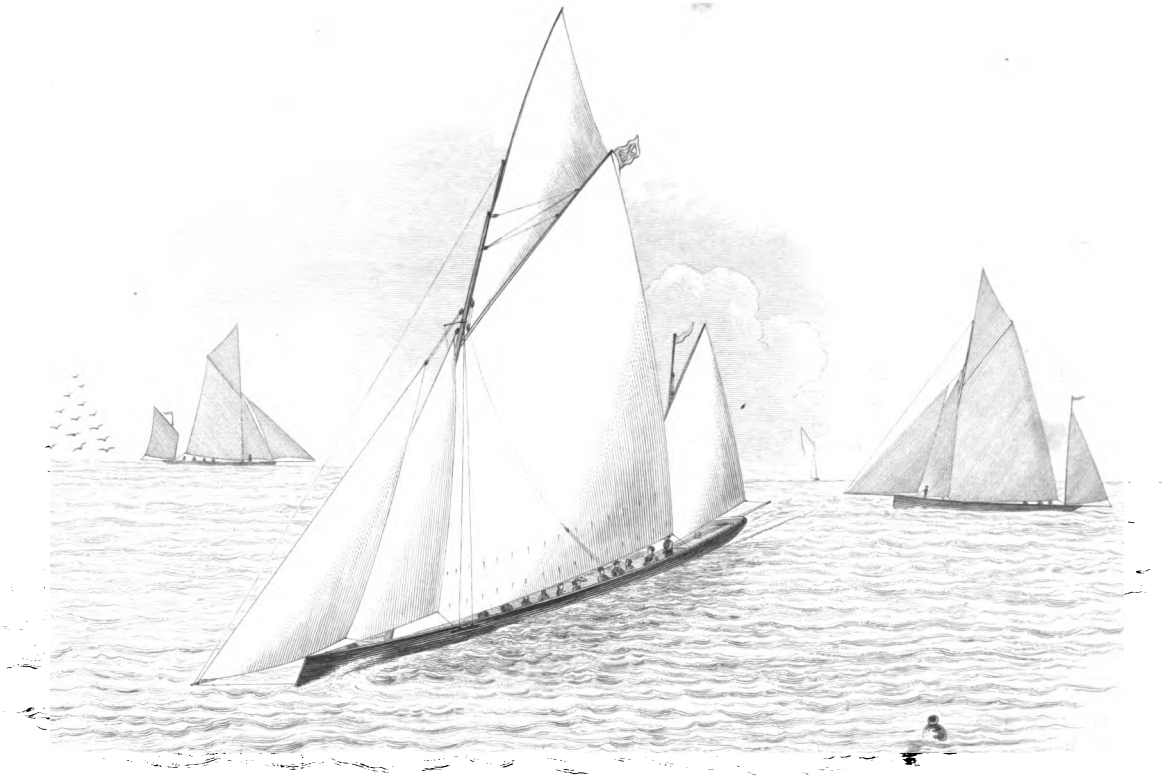

YAWL AND DANDY.

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The sloop is as useful a rig for a small yacht, or an open sailing-boat, as any that is known, and as simple in management; no topsail need be used, unless the boat is sufficiently stiff to bear one; and more or less peak can be given to the mainsail by simply pulling on or easing the halliards.

THE YAWL RIG.

THE term *yawl*, as distinguished from the yawl-*rig*, signifies a boat with stem and stern alike; both ends being sharp, like a whale boat, or a Norway yawl.

A yawl is also a term applied to a man-of-war's boat, resembling the pinnace, but smaller; carvel built, and generally rowed with twelve oars.

The *yawl-rig* is a distinct term applied to a special form of the sails of a boat; so that any sailing-boat that is yawl-rigged is also termed a yawl.

The yawl rig consists of a gaff-mainsail—of a narrower form than that of a cutter, and without a boom—a fore-sail, jib, gaff-topsail, and jigger, or lug-mizzen. (See the engraving on opposite page.)

For comfort and convenience, the yawl rig is one of the best and handiest that is known, whether for a yacht or pleasure boat, large or small. The mainsail being all inboard, and much narrower than that of a cutter, it is less difficult to manage, and can be the more readily reefed; and a lighter mast suffices. A boom being also dispensed with, is another great advantage, as it considerably lightens the rig, and enables the boat to ride easier in a sea-way; and the annoyance of a heavy boom swinging over head from side to side, when the vessel is tacked, is of course avoided.

The yawl rig is admirably adapted for a shooting or fishing yacht; in fact, no better rig is known for either purpose; many large English yachts and pleasure boats are yawl-rigged.

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THE DANDY RIG.

THE dandy rig bears a striking resemblance to the yawl rig, the only difference being in the mizzen-sail; which, in the dandy rig, is of Bermudian, or jib-like form, and set on the mast without yard or gaff. (See the engraving facing page 39, which illustrates both rigs—yawl and dandy.)

Some of the open pleasure boats on the south coast of England that are so rigged are fine, powerful vessels. Among the large ones I measured was a boat nearly fifty feet in length, by thirteen and a half or fourteen feet in width, and of the burthen of twenty tons and upwards; a perfectly open boat, capable of carrying twenty or thirty persons, without crowding.

Although so large and capacious, these boats, whether yawl or dandy-rigged, are safely managed at sea in ordinary weather by two persons.

The most laborious work belonging to them is the beaching and launching; but, with the facilities of capstans, rollers, and other contrivances, the toil is considerably lightened.

The advantages belonging to the dandy rig are precisely the same as those of the yawl rig; the mainsail swings clear of the mizzen, and is worked without a boom, whereby the danger and inconvenience of that heavy contrivance, swaying over head, is avoided—a matter of considerable importance in a boat laden with passengers.

THE SCHOONER RIG.

THE fore-and-aft schooner rig consists of two masts and three principal sails, viz. a mainsail, which is, in fact, a gaff-sail fitted with a boom; a spencer, or fore-sail, which is fitted with a gaff, but (generally) without a boom; and a stay-sail, which is the leading sail, and is set on the fore-stay. In addition to these sails, schooners sometimes carry topsails, jibs, and flying-jibs. When a jib is used, a jib-boom has to be run out

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beyond the standing bowsprit; and as regards the topsails, in some vessels gaff-topsails are used, in others jib-headed topsails.

Schooners of a larger class are fitted with square-rigged topsails; in some vessels on the main-mast only, in others on both masts. These vessels are termed square-rigged schooners, and square-topsail schooners, and sometimes square-headed schooners.

The schooner rig is, unquestionably, the very best, safest, and handiest of any for large yachts; and it is, besides, a favourite rig for large open pleasure boats, particularly those of a long and narrow form of hull, with sharp bows.

Schooner-rigged boats have long been in use by the native boatmen on various parts of the English coast; and since the victories gained in English waters by the famous schooner yacht 'America,' (1) various improvements have been made in the form and rig of schooners; so that schooner-rigged yachts of a superior class have become numerous.

The stay-foresail of a schooner is usually set out beyond the stem by means of a bumkin, or a standing bowsprit; the spencer, or boom-foresail (which is the middle sail of the three), requires no boom, although one is frequently used; but the mainsail should be fitted with a boom and goose-neck, in the usual way. The two masts should be connected at the top by a jumper or triatic stay; and the spencer-peak should swing clear of that stay. In sailing a schooner-rigged vessel, the staysail-sheet is eased off on coming about, and the spencer kept aweather to pay her off. When running before the wind, the mainsail and spencer are boomed out, one on each side—styled, 'goose-winged.'

There are many magnificent schooner yachts belonging to members of the various English yacht clubs, some of which are of beautiful form and construction; and the interior accommodation abounds with every comfort and luxury man can desire. Such vessels are truly an ornament to our seas, and the pride and boast of the pleasure squadron.

(1) See *infra*, 'American Racing Vessels,' where a full description and engraving of that celebrated yacht is given.

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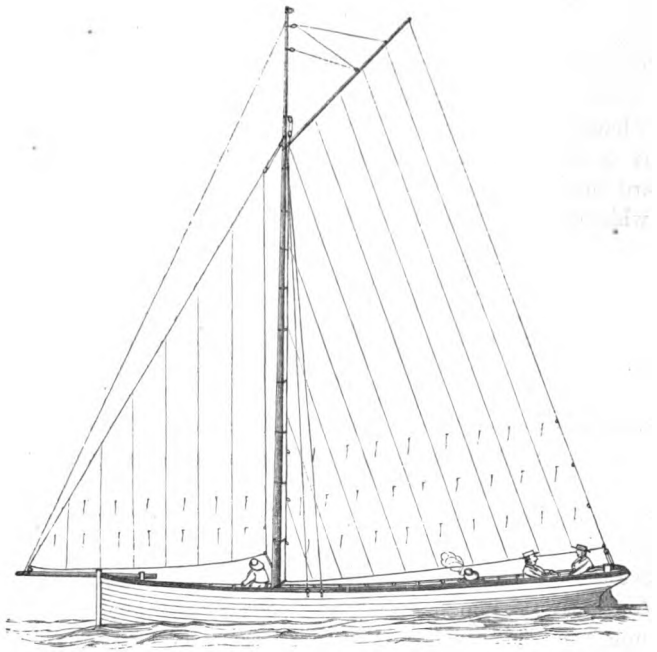

ITCHEN RIVER BOATS.

THE Itchen river, or Southampton, fishing boats are rigged in a simple but most useful and handy manner. Their chief peculiarities consist in a lofty mast and narrow-headed gaff-mainsail, without a boom. The mainsail travels, at the clew, on an iron hawse across the stern, in the ordinary manner, and the sail is all inboard, a great advantage in bad weather. The fore-sail is also a lofty sail, but stands chiefly inboard. In squally weather these boats are frequently worked to windward under the head-sail only. When the mainsail is close-reefed, it is reduced to less than half its size, and is all inboard. These are great advantages in heavy seas and strong winds.

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In fine weather and light winds they sometimes set a sharp-headed topsail on a small spar, which answers both purposes of yard and top-mast.

These boats require very few ropes as rigging, they are extremely handy under sail, and may be managed easily by two hands, unless the vessel be of extra size and rig.

It is a well-known fact that some of the best hands on board our racing yachts are taken from the Itchen river boats, in which they have received their training.

LUGGERS.

A LUGGER is a boat or vessel rigged with lug-sails; some have one sail only; others two or three, besides a fore-sail and a mizzen; and boats of a large size, as sea-going and coasting luggers, sometimes set a topsail above the main lug-sail. The south coast fishing luggers in fine weather set their topsail above the mizzen-lug.

Anciently the lug-sail, if not the only form of rig used for sailing-boats and small vessels, was at all events the most general one. The *ancient* lug-sail was of square-like form, with a yard or spar at the top, and a sheet or guy at each of the lower corners. Modern sailors still find the lugger rig an exceeding handy one for boats and small vessels, whether decked or not. Lug-sails are now cut in various shapes, with more or less peak, according to fancy and the form of the boat for which intended.

The lugger rig has been from time immemorial a favourite one among beachmen, pilots, fishermen, and others, for open boats: and as such men have great experience in boat-sailing, and would naturally select that which they consider the safest, most effective and useful, it may be fairly concluded that the lugger is the most convenient rig of all for an open coasting boat. The lug-sail requires less ropes and rigging than any other: in open boats, the single halliard-rope serves as a stay

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(when such is necessary) to the mast, the only other rope required being the main-sheet.

Some of the sea-going luggers employed on various parts of the coast rank among the finest and most powerful open boats in England; particularly the large open three-masted luggers, an engraving of one of which appears on the opposite page.

One of the chief advantages in the lugger rig is, the facility with which sail may be shortened; and a lugger which in fine weather carries three lugsails, a jib, and topsail—in all, five sails—may be sailed in heavy weather under one or two only of the lug-sails, selected from the smaller ones. Another advantage is the lightness of the spars, and the facility with which one or more of the masts may be struck, and the boat relieved of the heavy pressure of top-hamper, a great advantage in bad weather.

A large and well-appointed lugger, with two or three masts, is probably as safe and handy a form of rig for an open sailing-boat, for knocking about at sea in 'all weathers,' as any that has been contrived; and there are, undoubtedly, among the fishing, piloting, and coasting class, more boats fitted as luggers than any other form of rig, from which it may be inferred that the lugger rig is, for general purposes, the handiest and safest that is known.

A well-rigged lugger has, besides, great power as a sailing-boat; and the masts being small and light, in proportion to the large area of canvas that is spread, the boat rides easily under her spars, and sails with less labouring in a sea-way than one with a single heavy mast.

Pilots, on approaching ships at sea, are enabled to lower a lug-sail in an instant, and strike the mast, to avoid collision with any part of the ship's rigging. A rope is then thrown them from the ship; with this they make the boat fast, and then quickly board the vessel. But in very rough weather and heavy seas, there would be great danger in running a boat alongside a vessel; so the pilot takes a turn round his waist with the rope thrown him from the ship, and casts himself into the sea; he is then cautiously drawn aboard the vessel.

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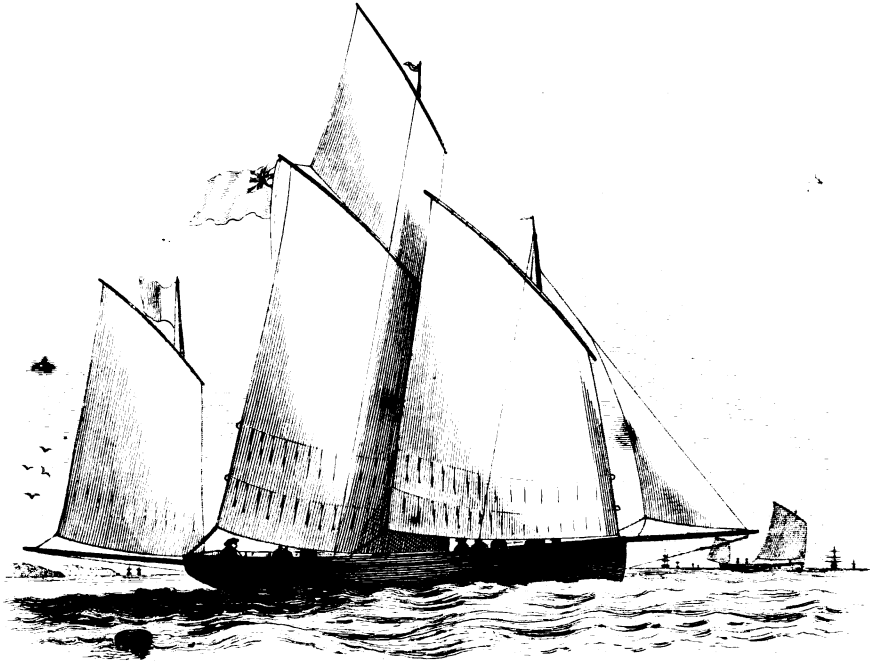

THREE-MASTED LUGGER.

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A good and useful method for small boats is that in which the lug-mainsail and fore-sail are both in one, in which case the tack must be hooked to a tackle in the bows, or at the stem. When a separate fore-sail is used, the tack of the lug must be hooked at or near the lower part of the mast, or it may traverse a hawse just in front of the mast. There are various improved methods of hoisting, setting, and lowering this sail, and of 'dipping the lug,' as the crew of a man-of-war term it.

Dipping the lug is a smart, active performance, although simply that of swinging the yard to the other side of the mast at the instant of coming about, for the purpose of placing the yard on the leeward side of the mast, it being an eye-sore to good seamanship to see the yard and sail pressing the mast aweather. It requires at least two persons to dip the lug, one to slack the haliards a few inches, another to attend the tack, the main-sheet being also eased off; then, at the moment the boat is in stays, one of the crew jumps upon the thwart, and dexterously swings the fore-part of the yard to the other side of the mast; the halliards are then set taut, the tack secured, the main-sheet hauled in, and the boat is quickly on a fresh tack with the sail fairly set. When actively done, this is a sailor-like performance.

The original method of shifting the lug-sail, when putting about on change of tack, is to lower the sail, unhook the yard from the traveller, and shift it whilst down; although a slow performance, and one to which many objections may be raised, it is still a good deal practised by fishermen and others, in small open boats, on various parts of the coast.

Some of the north-country cobles which are fitted with lug-sail and fore-sail are ingeniously rigged, so that the sails may be managed with the same facilities as the sprit-sail and fore-sail; they sail on either tack without dipping the lug or lowering the sail, the yard remaining on the same side of the mast as when first hoisted; there are, however, only a few inches of the yard before the mast. Where this plan is adopted, brails are generally fitted to the sail, so that it is seldom necessary to lower the yard of the main-lug.

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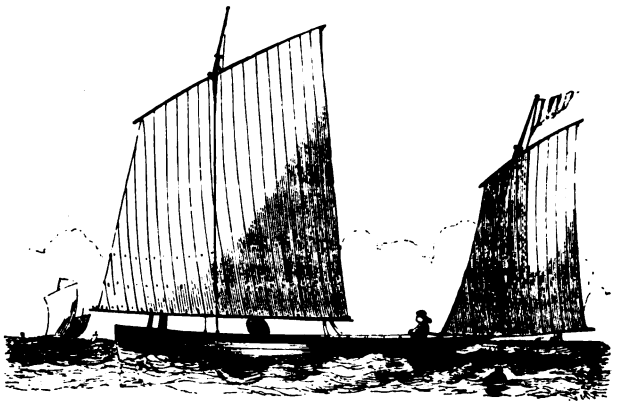

Improved Rig for a Lugger.

The yard for a common lug-sail should be slung so that one-third of its length only is before the mast.

An ingenious and excellent mode of rigging a lugger as a pleasure boat, or for general purposes, was suggested to the Author a few years ago by a gentleman of great experience in boat sailing, and who, for a long time, had a boat in constant use rigged upon this plan. As I had many opportunities of testing the merits of the rig, and of seeing the boat alluded to under sail, I am enabled to recommend it with confidence as a safe and handy rig for a small boat. I also present my readers with an engraving of the design, from a drawing made by the inventor himself, showing a lugger so rigged and under full sail. The method alluded to consists in a lug-sail of ordinary cut being laced to the yard, slung in the usual way, and hoisted with a mast-traveller and halliards; but the foot or flap of the sail is laced to a boom, and boused down quite flat and taut, by means of a small tackle at the foot of the mast. With a boat under this rig, there is no necessity for dipping the lug, or lowering it in any way, on coming about; the man at the helm can alone do all that is necessary.

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It is, in fact, almost equal, as regards convenience for tacking and manœuvring, to a shear-masted boat; the sail may be turned in any direction with ease and precision, and two or more sails can be used in the same boat after the same manner.

The Split Lug.

This rig has the appearance of being contrived out of a lug-sail split from top to bottom in line with the mast, so that the fore part of the sail, although suspended from the same yard, forms a fore-sail, and is trimmed and managed with independent sheets just the same as any other fore-sail, the singularity being that both sails are laced to the same yard, and neither can be hoisted or lowered without the other; therefore one pair of halliards suffices for both sails. The tack of the main part of the sail is made fast at or on the lower end of the mast; whilst the tack of the piece which forms the fore-sail is secured in the bows of the boat, and this part is worked with fore-sheets, just as an ordinary fore-sail. One of the advantages of this rig is, that in tacking, the yard need not be dipped or lowered, but the boat may be worked to windward with the facility of a fore-and-aft rigged boat, and without once lowering the yard or slacking the halliards.

Scottish Fishing Luggers.

These fishing boats are very numerous all along the coast of Scotland and the north of England. They are of two classes, the first a strongly-built craft, of great breadth of beam and considerable draught of water; the stem and stern-posts are both nearly perpendicular, and the stern in other respects very much resembles the bows. These boats are rigged with two masts; the largest or main-mast is placed far forward in the bows of the vessel, within a foot or two of the stem, and raking slightly aft: on this mast the main-lug-sail is set. The mizzen-mast and sail are small, in comparison with the wide spread of canvas forward; but in very strong winds the main-lug is lowered, and the boat is sailed under

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mizzen-lug and small fore-sail. They are safe and fast-sailing boats, and traverse the seas long distances from home, keeping company with the shoals of herrings, mackerel, and such fish as they go in quest of. Weeks and months are passed by the crew at sea in these boats; as also by their companions, the Dutch and French fishermen, in their fishing vessels around and about the English coast. And what is very remarkable and characteristic of ancient Scotland, these luggers are always manned by a race of people descended from the Scandinavian colonies established in many parts along the eastern coast of Scotland: the language spoken by these men quite confounds our south of England countrymen.

The other description of lugger employed by the fishermen on the north-east coast of Scotland differs from the former both as to construction and rig: in the latter the boat is very shallow, but of equal breadth of beam with the former, a much longer hull, and raking stem and stern-post. Notwithstanding their being of less draught of water, they carry larger sails than the former, which are placed exactly the reverse of the other method of rig: the smaller sail being placed forward, and the larger or main-lug aft. The fishermen belonging to the latter boats are a distinct race from the others, being exclusively Celts: the others would deem it a derogation of their creed to have a Celt among the crew in one of the first described luggers, whilst it would be equally so on the part of the Celts to carry a Scandinavian in their boats.

It is also very remarkable that the superstitions prevailing among fishermen, pilots, and beachmen, along the coast of Scotland—to which Sir Walter Scott, in his writings, has so frequently alluded—still exist. If an accident occurs to one of their boats, it is considered as foreboding some ill omen; and if a boat, new or old, be upset and any part of the crew drowned, that boat is no longer used, but is either sent adrift or left ashore as an abandoned wreck. Only a few years ago, a small pilot boat was capsized off the north-east coast, and part of her crew drowned; the boat, although nearly new, was towed out to sea and cast adrift by the owners, who thus

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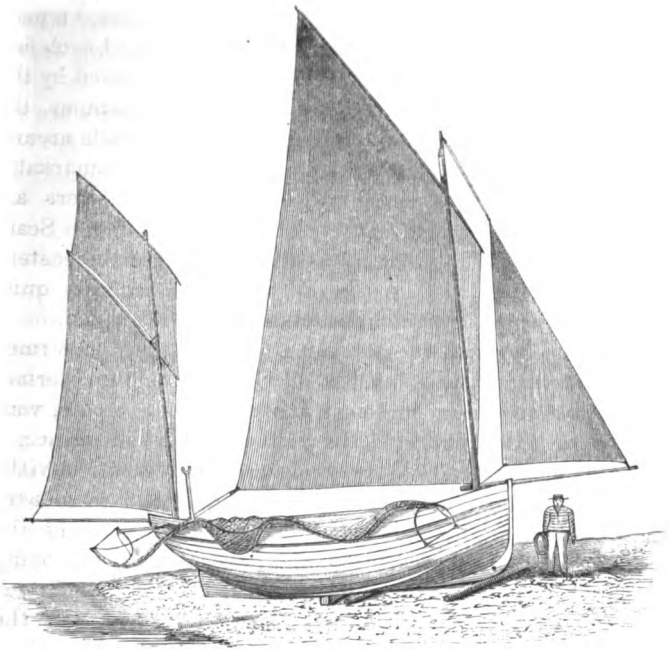

South Coast Fishing Boat.

left themselves destitute of the means of subsistence. The superstition is so deeply rooted in the minds of those people, that they would rather remain ashore with starvation staring them in the face, than venture to sea in what they term an 'unlucky boat.'

South Coast Fishing Boat.

The coasting and Channel fishing luggers are a very numerous class. With the majority there is great similarity, particularly in those of the south coast of England, which are rigged as luggers, carrying main-lug, mizzen-lug, fore-sail, and mizzen-topsail. The main-mast is stepped as far forward as possible, so that the fishermen have a clear space amidships

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for working their nets, trawl, and other gear. The engraving above is made from a photograph of one of these boats, hauled up on the beach, with sails spread, and fishing trawl suspended at the side.

The sails of these and of most other fishermen's boats are all of a dark colour, being steeped in liquid curriers' tan, for the purpose of preserving them from mildew and otherwise adding to their durability.

Mount's Bay Fishing Luggers.

These boats, which belong to the class just described, have been much improved of late years, so that they now rank among the fastest and best fishing luggers on the English coast. They are very capacious and powerful sea-boats, well adapted in form and rig to the purposes for which they are chiefly employed, viz. mackerel, pilchard, and herring fishing. They have great breadth of beam in proportion to length, sharp bows, upright stems, and raking stern-posts; also a forecastle deck, under which the crew occasionally sleep. They are fitted with two masts, one of which (the main-mast) is stepped 'chock for'ard,' in the very bows of the boat, and the mizzen-mast well aft; the sails used are main-lug, mizzen-lug, fore-sail, and mizzen lug-topsail, all of which are tanned for preservation. (See engraving, page 49.) The hardy race of Cornish men who man these boats make voyages of many hundreds of miles, in the course of the year, in pursuit of their calling.

If a storm overtakes them at sea, they disdain the idea of running for a harbour, and contrive to ride out the gale by lashing spars and wooden gear together, in the form of a raft, and riding the vessel by it. The raft breaks the force of the waves, and prevents their running over and swamping the lugger.

A few years since, a crew of five daring fellows undertook a voyage to Australia in one of these luggers, and performed it safely; taking the mail from the Cape of Good Hope, on their way.

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The recent improvements in the Mount's Bay boats may be attributed to their desire to outvie the many rivals they have to contend with; the chief of which are the French fishermen, from Cherbourg, Dieppe, and other parts of the Continent, who come over in their fishing vessels with the easterly winds of March, and harbour among the islands of Scilly. So numerous a fleet are these foreigners, that, were they disposed to invade those small islands, their force would be quite irresistible as far as the present occupants are concerned. Whilst there, they repair their nets, take in provisions, and large stores of salt for pickling herrings. The French boats are much larger than the Mount's Bay boats, being decked all over and fitted with cabins; the largest of the French boats carry a crew of twenty-five men each, which appears to be more than is necessary, either for the management of the boat or for working the nets. But all French boats are compelled to carry a certain complement of hands, according to tonnage.

On several other exposed parts of the English coast there are fishing luggers to be met with of very admirable powers, both as regards swift sailing and sea-going qualities. But there is so great a similarity in English coasting luggers, that, in the absence of any special characteristic, it is considered superfluous and tedious to enter upon an individual description of those employed at every port around the English coast: suffice it to say, that besides those already alluded to, and others to be noticed in subsequent parts of these pages, those belonging to the most exposed parts of the coast are invariably excellent sea-boats; and the able manner in which they are managed in the hour of peril has often been the subject of admiration by those who appreciate good seamanship.

Fishing Smacks and Stone Dredging Boats.

The fishing smacks, open boats, and small vessels employed in dredging for cement-stone and other treasures of the sea, are a very numerous fleet. They are rigged chiefly as cutters

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and sloops; but the form and build of these vessels has undergone considerable improvement of late years; and although there are among them, here and there, an old warrior yacht, the winner of many a hard fought sailing-match, still the best and finest boats of the class are built expressly for the purposes of the fishing and cement-stone dredging trade. The seamen who man these vessels have constantly the very best experience: being out at all seasons of the year, they are frequently exposed to gales and bad weather, when they are sometimes compelled to heave part of their hard-earned cargo overboard to lighten their vessels, on which occasions the lesser craft and open boats have to run for their lives to the nearest port.

These vessels assemble almost daily, in large fleets, at favourite spots for stone-dredging off the eastern coast: they leave the harbour in the morning and return at night, sometimes in so large a fleet as to produce a very pretty effect. When seen at a distance, actively engaged in their pursuits, in a lively breeze, they appear as if all huddled together; but seldom do they run foul of each other, although they appear to have many hair-breadth escapes. These boats are usually short, beamy vessels, and can be turned and put about with great readiness and precision; a very essential qualification in a dredging boat, as well as in a fishing smack.

Some of the finest and best class of dredging boats are those which hail from Harwich Harbour, Brightlingsea, Wivenhoe, and other parts of the coast of Essex and Suffolk.

BOATS OF THE WESTERN COAST.

In Cardigan Bay, Morecombe Bay, and other parts of the western coast of England, many of the coasting and pleasure boats are rigged as schooners. The liability to sudden squalls along that coast renders the fore-and-aft rig the safest and

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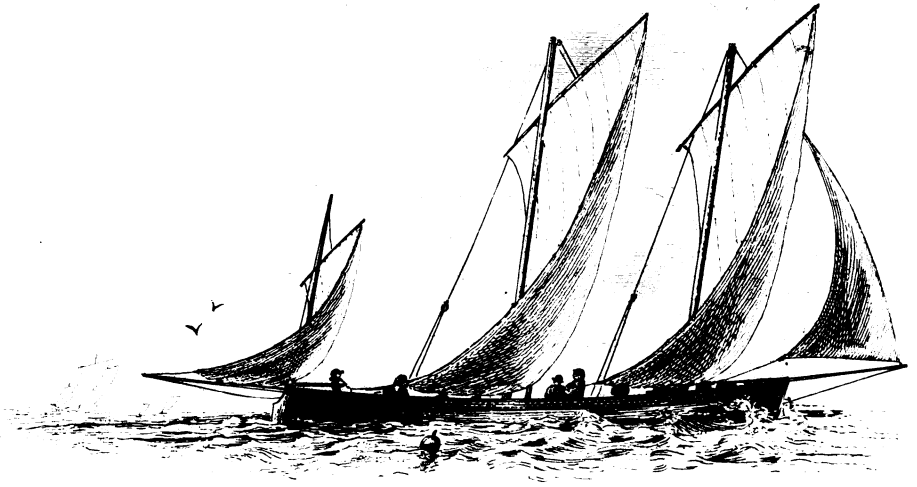

YARMOUTH YAWL.

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easiest to be handled; topsails are seldom used. Many of the fastest of these boats would be more than a match for some of the luggers of the eastern coast. They are exceedingly handy under sail, and particularly safe and easy in heavy seas.

Bristol Channel Pilot Boats.

The pilot boats at Swansea, and other localites in the Bristol Channel, are in some instances rigged with one gaff-sail only, no fore-sail being used, and seldom a mizzen; the mast is placed as far forward as possible, in the very bows of the boat. These boats sail remarkably well, and possess excellent sea-going qualities. The object in carrying no fore-sail or bowsprit is for the convenience of shooting up quickly alongside vessels under-way at sea, without the necessity of lowering sail, or incurring the risk of carrying away the bowsprit.

YARMOUTH YAWLS.

These splendid boats are the admiration of all who visit Yarmouth, Lowestoff, Aldborough, and some other watering places on the eastern coast.

They are the longest and swiftest yawls, if not the finest open boats, in the world. Some of them are upwards of sixty feet in length,(1) and from ten to twelve feet in breadth. They have a remarkably sharp and gracefully formed bow, which rises gradually from amidships; the stern is also somewhat elevated, so that they are much lower amidships than elsewhere. They are ballasted simply with bags of shingle, an inexhaustible supply of which is always at hand on the coast. The advantages of being so ballasted are, that as the crew frequently have to throw all their ballast overboard, on beaching through a heavy surf, they have only to open the bags and shoot it out, which is merely the work of a few moments. The

(1) The yawl 'Reindeer,' of Yarmouth, was 69 feet.

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boat is then light and buoyant; and on touching the beach, the crew instantly jump out, and haul her up out of danger. They are generally well-manned; and in a strong wind and heavy sea, all, except those who have the actual management of the sails, squat down in the bottom of the boat, to preserve its stability.

When the celebrated yacht 'America,' from New York, was in the days of her glory (having beaten on the Solent and elsewhere the fastest clippers of the Royal Yacht Squadron), the beachmen of Yarmouth sent the owner a challenge to race with one of their yawls on the German Ocean for £200. The terms stated in reply, on behalf of the owner of the yacht 'America,' were, that she would not be permitted to race with the yawl for a less sum than 1000 guineas, which sum was a stake beyond the reach of the beachmen, therefore no race took place. Such a sailing match would truly have been a singular one, on account of the unequal size of the competitors, the 'America' being a thoroughly decked vessel of 200 tons burthen and upwards, whilst the yawl was a mere shallow open boat. Had the race taken place, it is believed the yawl would have achieved the victory, unless it happened to blow a gale on the day of the match, in which case the yawl could not have competed with her antagonist; but in the 'America's' favourite six-knot breeze, or any wind in which the yawl could carry all her sails, the result would, it is believed, have terminated in favour of the yawl.

With a stiff breeze on their quarter, the Yarmouth yawls have actually sailed *sixteen* knots an hour, a pace unequalled by any yacht or sailing vessel in the world. Their beautiful proportions, large sails, lightness, and buoyancy, added to which, the exquisite seamanship of their crews, give them a superiority among the boating class which has never yet been surpassed.

The Yarmouth yawls are rigged with three masts, on each of which they carry a lug-sail, the largest, or main-sail, being amidships; the next size forward, and called the fore-sail or fore-lug; and the smallest aft, called the mizzen. They are

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also provided with a bowsprit, and in fine weather they set a large jib. In a strong wind or a gale, the jib and bowsprit are dispensed with, and the lug-sails are all close-reefed; sometimes the two smallest only are used, viz. fore-sail and mizzen, in which case the main-mast is lowered, which enables the boat to ride easier in a heavy sea.

These yawls generally belong to companies or crews, each man being entitled to a share in the earnings of the boat. The brave fellows who man them are a hardy, fearless class, and venture to sea in perilous gales to ships in distress. Hundreds of lives have been saved by their daring exertions. It is no uncommon thing in a heavy sea for two or three of the crew to be constantly employed in baling out the water that is shipped from the waves breaking over the bows of the boat. Such men are an honour to their country, and more credit is due to them than to the crews of life-boats, the latter being supposed to be safe, even if the boat should upset; but if the beachmen's yawl be upset, the crew have indeed a poor chance. Still, nothing daunted by wind or weather, when they espy a ship at sea with a signal of distress flying, or a signal for a pilot to conduct them in safety to their destined harbour, they man one of their famous boats, and at all risks proceed towards the ship, sometimes a distance of ten of fifteen miles. It is truly wonderful to witness the buoyancy of these boats in a heavy sea.

One grand caution which the crew adopt in the management of them is, never if possible to allow a heavy sea to strike the boat *a-broadside*, but always *stem on*. In turning the boat, when the waves are running high, they watch for '*a smooth*;' then, if rowing, all oars on one side pull one way, whilst the others back water, and the boat, although of such a great length, is quickly round.

Every facility is always at hand on the beach for launching these boats, such as capstans, cradles fitted with rollers, and other apparatus, provided by the boatmen for hauling them up out of the way of heavy seas.

Certain parts of the eastern coast, off Norfolk and Suffolk,

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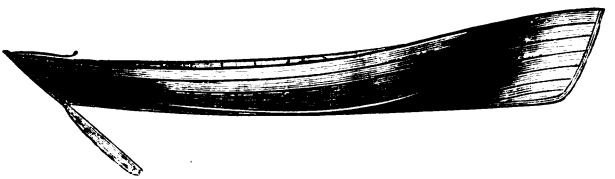
abound with sands and shoals, some of which are many miles out at sea; the value, therefore, in those parts, of the services of such boats and crews cannot be over-estimated by the shipping and mercantile community, nor indeed by anyone who has a fellow-feeling of humanity at heart.

The large coasting yawls are vessels of thirty and forty tons, decked and fitted with cabins. They cruise about off various parts of the English coast, sometimes in the roughest weather; and when many a large ship would gladly run for a harbour, these boats are beating about to render assistance to vessels in distress, and actually making good weather of it. These vessels are unable to approach and land their crew on the beach, like the others, and can only do so in harbour.



THE COBLE.

The north country cobles are, probably, the most perfect form of open sailing-boat for putting out to sea in rough weather of any yet invented (life-boats alone excepted). These boats are of Yorkshire origin, and from time immemorial have been renowned for superior qualities as safe sea-boats, when under experienced management; but in unskilful hands they are as liable to accident as other boats.

Cobles are the favourite and prevailing form of boat all along the north-east coast of England. At Flamborough Head, on the Yorkshire coast, no other description of open boat is considered safe to put to sea in, and it is seldom that any other is used there in rough weather; but that is a very dangerous

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and rock-bound point, upon which a north-east wind causes a tremendous sea.

Cobles have a very high, flaring, but beautiful bow, sharp and hollow, and a graceful wave-like form of rim from stem to stern; at the latter point the graceful proportions of the coble cease, for the stern presents a flat, raking surface, not unlike the end of a large tree sawn asunder in a slanting direction. The rudder is deep and narrow; it reaches four feet or more below the bottom of the boat, in a slanting direction, and, acting both as rudder and keel (or aft-gripe), is of infinite service in a heavy sea, the deep hold of its peculiar rudder enabling the steersman to keep the boat from broaching-to. (See the engraving on opposite page.)

These boats have no actual keel aft, but the sharpness of the bow gives them a good fore-gripe. All along the other part of the bottom they have a very flat floor; indeed, *quite* flat towards the stern, where the form of the boat is much narrower than amidships. The sides are bulged out in form, abaft the bow, but 'tumble home,' or incline inwards, at the top and gunwale.

The coble is generally sailed under a large fore-and-aft lug-sail and small fore-sail, but in fine weather a jib is also used. The lug-sail is, in modern rigged cobles, fitted upon the most approved plan, so that it need not be dipped (1) or lowered on coming about.

There are three steps attached to the floor of the coble for receiving the heel of the mast, so that in light winds the mast is stepped in an upright position; in a fair breeze it is stepped in the middle step, which inclines it aft, in a raking attitude; and when blowing heavily, it is stepped in the third position, which is very raking. The aft rake of the mast tends to ease the bows of the boat immensely in a heavy sea, and to assist it in rising to the waves.

When a jib is used, the bowsprit is not placed in a horizontal position, but with the outer end tipped up, like the jib-boom of a schooner, the advantage of which is obvious. If the bow-

(1) *Ante*, page 46.

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sprit were run out horizontally, the boat, when pitching in a heavy sea, would soon carry it away, and the pressure of the sail, acting on the bows, would assist in burying the head of the boat under the waves; but by inclining the bowsprit upwards, such an evil is avoided, and the sail acts as a lifting, as well as a powerful drawing sail.

The safety of the coble under sail depends in a great measure on the proper adjustment of the main-sheet: in a strong wind it is never made fast, but has frequently to be eased and humoured to the waves, particularly when the sea is running high.

In small rivers and shallow waters, the coble would prove inferior as a sailing boat, on account of the deep rudder and high flaring bow. Some persons have, however, occasionally taken so great a fancy to these boats as to insist on trying experiments with them in smooth-water rivers, for which purpose all the lower part of the rudder extending below the boat is cut off and added to the aft part, making it of the same shape as the rudder of a flat-bottomed sailing barge; but, independently of the want of a keel, the very high bow is an impediment to fast sailing in smooth water, from its catching the wind, and causing the boat to blow to leeward.

When ballasted, the coble has a great hold of the water forward, but very little aft; and the deep-diving rudder must therefore be shipped before anything can be done with the boat under sail. This rudder is then a powerful lever for preventing the boat from broaching-to in a heavy sea, which a coble is very liable to do in the absence of such a rudder, by reason of the sharp fore-gripe of the bow.

In order further to guard against such an evil, in some instances sliding keels, or centre-boards, have been introduced among the north country boatmen, and found to answer remarkably well; for when the keel is down, and the rudder shipped, the coble has all the properties of a keel-boat, both in working to windward and running in a heavy sea.

Cobles are used by all classes of boatmen on the north-east coast: for instance, there are fishing cobles, pilot cobles (the engraving represents a pilot coble with its sail struck,

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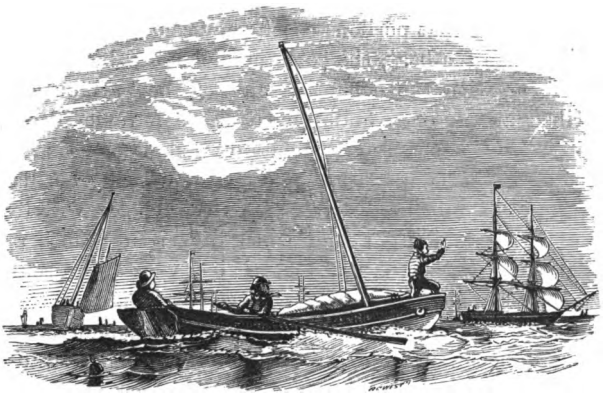

Pilot Coble.

and about to approach a ship for the purpose of putting a pilot on board), salvage cobles, and pleasure cobles. The largest size are those employed in the herring fishery; some of these are from ten to fifteen tons burthen, and have a small cabin, either in the bows or just abaft the mast. A middle-sized coble is about twenty-four feet in length, by five feet two inches in breadth, and two feet two inches in depth; the rudder projects four feet below the stern.

A few hours before dusk on a summer's eve during the herring season, a very interesting scene frequently may be witnessed, as several hundreds of these boats leave the different ports and harbours on the coast. Not a white sail is to be seen among the whole fleet—all are tanned for preservation from wet, and to make them more durable. So highly esteemed is this tanners' preparation, that the fishing nets, and even the clothes worn by many of the coble-men, are dipped in the same odoriferous liquid. The coble fishermen often go many miles from the coast, and drift their nets in company with the Scotch luggers, Dutch, and other fishing boats, from all of which the English and foreign markets are supplied with fish.

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The North of England boatmen manage these cobles with remarkable skill and dexterity; and though often exposed to gales at sea on that perilous coast, they seldom come to grief.

As an open sea-boat, the coble is unequalled by those of any other form, with the exception only of the Yarmouth yawls, described at page 53; and the latter, be it remembered, are adapted to meet the requirements of a shallow coast, whilst the coble is for the deep seas of a bold and rocky headland.

It is astonishing the heavy seas these cobles will live in, under skilful handling; and when they scud before a gale, they are so quick and lively that it is a very rare occurrence for a breaker to curl over the stern, as would be the case in a heavy sea with many other boats of a different form.

On approaching the beach, or going into shallow water, the rudder is unshipped, and the coble is backed in, stern first; the stern being of considerably less draught of water than the fore part. When rowing these boats, whether before the wind or otherwise, they are generally propelled stern first, because they row easier and better in that position.

The *coble oars* are different to those of other boats. They consist of two separate parts, the loom of the oar being a square or flat-sided piece, and the blade, with a short portion of the loom, is usually joined to the other by two iron bands, which secure and hold the two parts firmly together; the flat part of the loom rests on the gunwale, and in that position will not admit of being *feathered* in a similar manner to that of an oar with a round loom. An iron ring is firmly attached to the coble oar at its proper equipoise, which fits loosely over a single iron pin or thowl, so that there is no danger of the oars going adrift, although left suspended over the sides of the boat; and they may be turned close in, either towards stem or stern, without unshipping.

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THE LATEEN (OR LATINE) RIG.

THIS is one of the prettiest and most elegant modes of rigging a pleasure boat of any that is known. A lateen-rigged boat never fails to win admirers, if the sails are true lateens, well cut, and fairly set. But there is no rig in which the pretty effect so much depends on the shape and make of the sails.

Lateen sails never look better than when seen gliding along under the shadow of lofty mountains, or beneath the frown of high basaltic cliffs; their tall slender peaks and white triangles contrasting favourably with the dark features of mountain scenery. (1)

The shape of a lateen sail is triangular, or precisely that of a large jib or fore-sail; it requires a long, stiff, tapering yard to spread it.

A boom is sometimes used in English boats rigged with lateen sails of a large size, though seldom in foreign lateens.

The mast for the lateen rig rakes forward, or towards the bows of the boat; it is very short, and requires to be well secured with stays and shrouds.

Boats sail very fast under this rig, particularly when close-hauled; the one objection is, the very long yard that is required to set the sail fairly, often considerably longer than the boat, therefore somewhat cumbersome and inconvenient for stowing away if let down on deck. This inconvenience, however, only arises when the boat is rigged with a single lateen sail; when two are used (and such is a very general mode with lateen-rigged boats), the yards are not so long as to be inconvenient.

In lateen-rigged boats of broadish build, carrying only one mast and sail, the yard required would be nearly twice the length of the boat. If rigged with two masts and lateen sails, then each yard would be at least the full length of the boat.

(1) See the Frontispiece engraving of the Nile boats, which are rigged with lateen sails; and see also other engravings of Lateen Sails, *infra*.

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For the yards for lateen sails there is really no proper kind of spar but bamboo, which is not one-tenth the weight of fir or pine spars. Good sound bamboo spars suitable for large lateen sails are, however, very difficult to procure in England, though found in abundance in far Eastern lands.

The lateen rig is suitable for smooth water and light winds, but perilous in heavy seas and strong winds, because of the loftiness of the peaks of the sails and the difficulty of satisfactorily reefing them. The peak cannot be dropped or lowered, as that of a gaff sail, though brails may be fitted for frapping the sail close to the yard; but, even then, the swaying to and fro of the long yards, in a heavy sea, is sometimes dangerous.

But in smooth water the rig is safe enough, for, although the peak of the sail stands very high, the principal breadth and body of the canvas is low—a great consideration in rigging all open boats. It is also worthy of remark that, when running before the wind, if the boat be rigged with two lateens, they may be 'goose-winged,' that is, boomed out over the gunwale, one on each side of the boat; and when scudding before very light winds, the jib is occasionally slung as a topsail between the two peaks of the lateen yards.

A lateen-rigged boat, with the sails goose-winged, and running before a fresh breeze, is a very pretty object; when viewed from a distance, it looks like an enormous bird skimming the waters, with extended wings.

The Mediterranean is said to be the birth-place of lateen sails; there they are met with in every size and variety, and among them are many fast-sailing and beautiful boats. Every one who has cruised in Mediterranean waters, and along the coast of Spain and Portugal, must have seen and admired the lateen-rigged boats, with their lofty-peaked and graceful-looking sails; also the activity of the Spaniards who man them, the nimble manner in which they climb the slender yard, and perform other feats of seamanship very amusing to English sailors. These boats are seldom seen off the coast of Spain in fine weather, without two or three of the crew clinging to some part of the yard, or at the top of the stumpy-headed mast, where they sometimes remain for an

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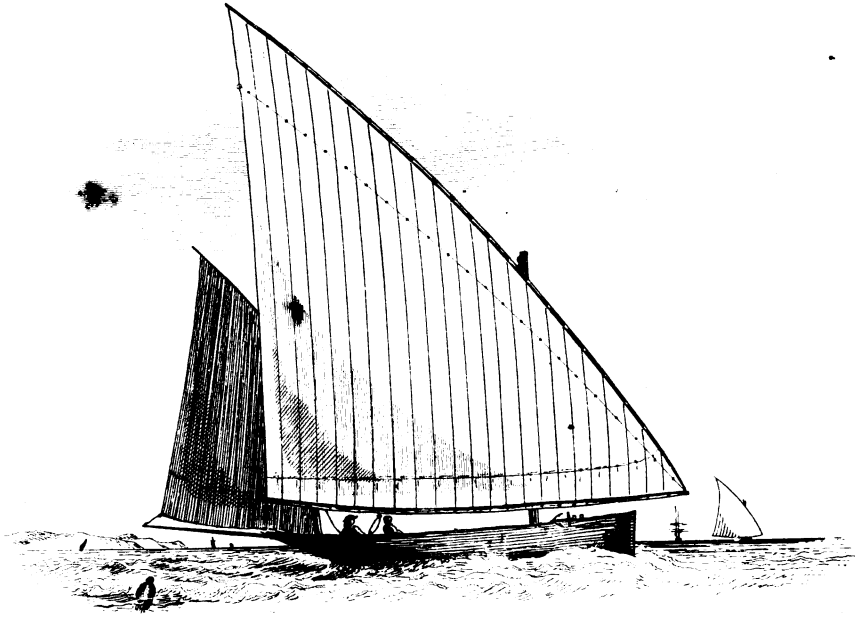

NORFOLK LATEEN.

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hour or more at a time, but for what purpose it would be difficult to say.

The lateen rig has been adopted by several other nations, although but little used in England. It is found in full perfection in and about the Mediterranean Sea, on the River Nile, the Lake of Geneva, at Bombay, and in various other parts of the world. It is an excellent rig for a sailing-boat where light airs and smooth waters prevail; but for strong winds and rough seas, there are other rigs which probably answer better. When a boom is attached to the lateen sail, the fore-end should be united to that of the yard by a small joint, or S; a hook should also be fitted to the lower part of the mast, so as to hold the boom close to the mast on the leeward side. By this method, the heel, or lower end of the yard, must not be secured at the stem of the boat; in fact, no other guys or fastenings will be required for the lower part of the sail, except the main-sheet aft, and a small tackle at the bows, which will enable the sail to be easily worked and turned about in any direction by one person alone: a very flat and effective sail for working to windward may be set in this manner. Lateen sails are reefed, not at the foot, as other sails, but along the fore-leech, close to the yard. The operation of reefing is performed by the Spaniards, in large boats, without lowering the yard. Lateen-rigged boats generally require more hands to manage them than those of other rigs.

Norfolk Lateen Rig.

The lateen-rig, as shown by the engraving on the opposite page, consisting of a lateen fore-sail and lug-mizzen, is one adopted on the River Yare, in Norfolk, for the pleasure-boats of that locality. It is admirably suited for narrow waters and tortuous rivers, where short tacking is unavoidable.

Boats for turning to windward in narrow channels must be short and wide; a long rakish craft is unmanageable in such waters.

Among the Norfolk lateens are some of the fastest and prettiest boats, after this rig, of any in England: the largest

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are twenty-six feet on the ram (or from stem to stern-post), and ten feet beam; the smaller size are sixteen feet on deck, whilst the breadth of beam is eight feet six inches.

The lateen fore-sail, which is much the larger sail of the two, is peaked up by a yard of almost incredible length in the larger sized boats. The customary length of yard for the *smaller* size is from *forty-nine to fifty feet!* thus enabling them to set an immense sail with a very lofty peak; but notwithstanding this, the sail, if properly made, stands very flat, and the boat is extremely handy under such a rig in staying, or any other manœuvre requiring quick movements. The safe management of a boat rigged in this manner may be performed by one person alone. After the lateen fore-sail is once set, it is entirely under the control of the person attending the main-sheet, and may be turned about in any direction with ease and precision. An iron traveller is connected with the boom at the lower part of the mast; and as this is the only fastening by which the sail is held down, it may be worked with almost equal facility to that of a revolving-rigged boat. The boom is elevated a little above deck, so that nothing may incommode the crew; the mizzen works of itself, with little or no trouble.

The Norfolk lateen is altogether a most useful and ingenious rig for short tacking in smooth water, and there is none that can compete with it for beating up against wind in very narrow waters; but for wide waters and sea-going purposes, the Norfolk lateens were never intended. This main-sail is reefed in the same manner as other lateens, viz. along the fore-leech, so as to be frapped or laced close to the yard.

The Strangford Lateen Rig.

This is a new form of lateen rig, upon a plan adopted by Lord de Ros, who kindly sent me a description of it, with a drawing from which the engraving on the next page has been made. His lordship's well-known skill and experience in yachting and boat-sailing is alone sufficient to recommend it; and his lordship informs me that he finds it a remarkably handy and weatherly rig for a small boat.

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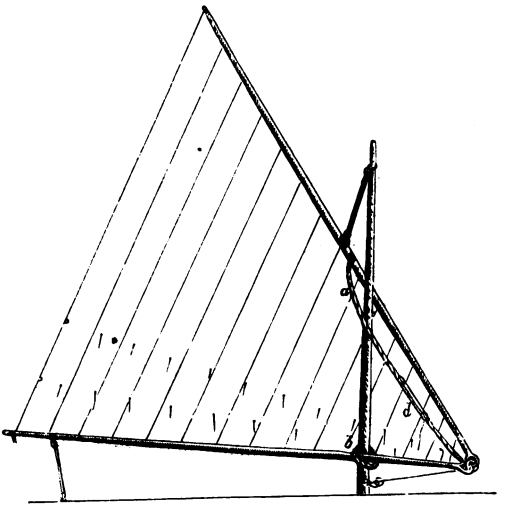

The Strangford Lateen Rig.

From the above engraving, it will be seen that the boom is parrelled to the mast at *b*, but the yard is kept to the mast by a jack-rope, *a*, which is hauled taut by a small tackle, *d*, composed of two small blocks, or of metal thimbles, and ratline; thus enabling the yard to be lowered, either partially for reefing, or wholly for striking sail, without disengaging the tack from the fore end of the boom, which must be done if the yard be hoisted and held to the mast by a traveller.

The boom and gaff thus close like a pair of compasses; and the reef-points being run from the apex at the tack, to the usual distance on the aft-leech, the sail, when reefed, is brought down lower, but the aft-power of it is not diminished.

It will also be seen that by this ingenious contrivance the sail may be reefed at the lower part, instead of along the yard, as in other lateens; a great advantage in a lateen-rigged sailing-boat, as the sail would otherwise have to be lowered for the purpose of being reefed. (1)

(1) I have called this the 'Strangford Lateen,' as the inventor, Lord de Ros, first tried and brought it into use at Strangford.

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THE SHOULDER-OF-MUTTON SAIL.

So called from its resemblance to the flat side of a shoulder of mutton. It is a rig best suited for smooth water, and seldom used on the coast, or in wide open rivers. The main-sail, when properly shaped, is neat and pretty; whilst the tapering peak is useful under high cliffs, when the lower part of the sail is sheltered from the wind.

The shoulder-of-mutton sail requires neither spreet nor yard; it is set entirely by the mast, a light tapering spar, placed well forward in the bows of the boat. The rig very much resembles the Bermudian, and is in some respects very similar. The halliards need only be of small-sized rope, much smaller than for square-headed sails, and should be rove through a small block at the mast head, and securely hooked to the peak of the sail: no other halliards will be necessary for the main-sail of a small boat. The sail may be bent to the mast by a lacing, or by small copper hoops, or rope grommets; but neither hoops nor grommets must extend higher up than the fore-halliard block, which should be seized to the mast about three-fourths of its height from the stepping. A boom should be used for the main-sail; and the fore-sail, which is necessarily lofty, must be narrow, unless the boat is very stiff, in which case a large and powerful fore-sail can be set.

The advantages derived from this rig are, that the heavy sway of spreet or yard is avoided; that, on reefing the sail, the widest and heaviest part is taken off the boat at once, whilst the light tapering peak is still maintained.

Boats under this rig sail well, are easily worked, and quickly reefed; brails may be fitted to the main-sail in the same manner as for other sails. The neatest and quickest method of stowing these sails is by furling them close to the mast, without lowering.

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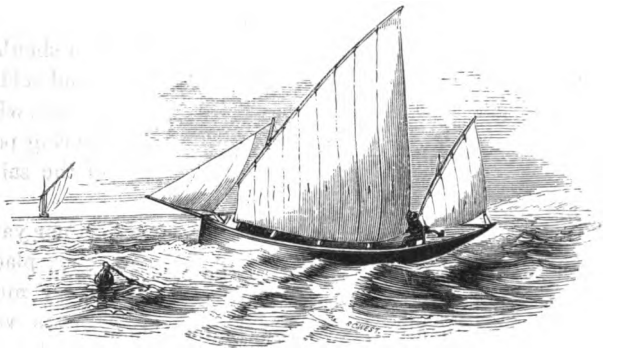

THE SETTEE RIG.

THE settee rig, though now but little used in English waters, was formerly a favourite one for small open boats; and it is still the most general form of rig that is used for the native sailing-boats and vessels of India, where it is termed 'lateen.' It has, in fact, the appearance of a lateen sail with the fore angle cut off. In some respects, and for some purposes, it is to be preferred to a lateen sail, by reason of the facilities afforded for reefing, which cannot usually be accomplished in a perfect lateen, and by reason also that a settee sail may be set with a shorter yard than a lateen. The settee main-sail, when close-reefed, forms a triangle, and has then the appearance of a true lateen.

Although the settee sail has a lofty peak, the hoist is low, therefore a short mast suffices to set the sail; and consequently the fore-sail is short in the aft-leech. The mizzen may be either a perfect lateen, or a settee of the same shape as the main-sail; for small open boats the former is to be preferred, but for larger ones the latter.

The settee is a very safe and pretty rig for a skiff, or any small open boat. It also answers well for boats of a narrow form, in which it is important, for safety's sake, to keep the broadest part of the sails as low as possible.

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It is also well adapted for a sailing punt, or indeed any other light and narrow-shaped boat fit for carrying sail; no higher peak need be made to the main-sail than necessary, but for a stiff and powerful boat the lofty peak is very effective in smooth water.

THE SAILING BARGE.

PLEASURE barges are best adapted to those localities in which the water is shallow, and where the keel-bottomed boat would be found inconvenient. They are a comfortable form of vessel for pleasure parties, and well suited to the taste of the timid; being flat-bottomed, they do not careen to the wind so much as other vessels, and they generally afford ample accommodation for passengers or cargo; no ballast is necessary, the flat floor being sufficient to maintain stability under considerable pressure of canvas. The general form of rig is a gaff-mainsail without a boom, spritsail-mizzen, and a fore-sail; but sometimes they are rigged with a sprit-mainsail, fore-sail, and mizzen, similar to the London trading barges. The flat-bottomed sailing barge is, of necessity, fitted with lee-boards on each side of the hull, the leewardmost of which is lowered when sailing on a side wind. These vessels require a very broad-shaped rudder, and are not generally so manageable, nor so fast under sail, as boats with round bottoms and keels.

THE SLIDING-GUNTER.

THE sliding-gunter is a pretty and ingenious form of rig for a pleasure boat; it is also one that is often used for the sailing-boats attached to large yachts, ships of war, and large merchant ships. It consists (as regards a *single-masted* sliding-gunter) of two sails only, viz. main-sail and fore-sail. The main-sail of the sliding-gunter is of the same shape as a

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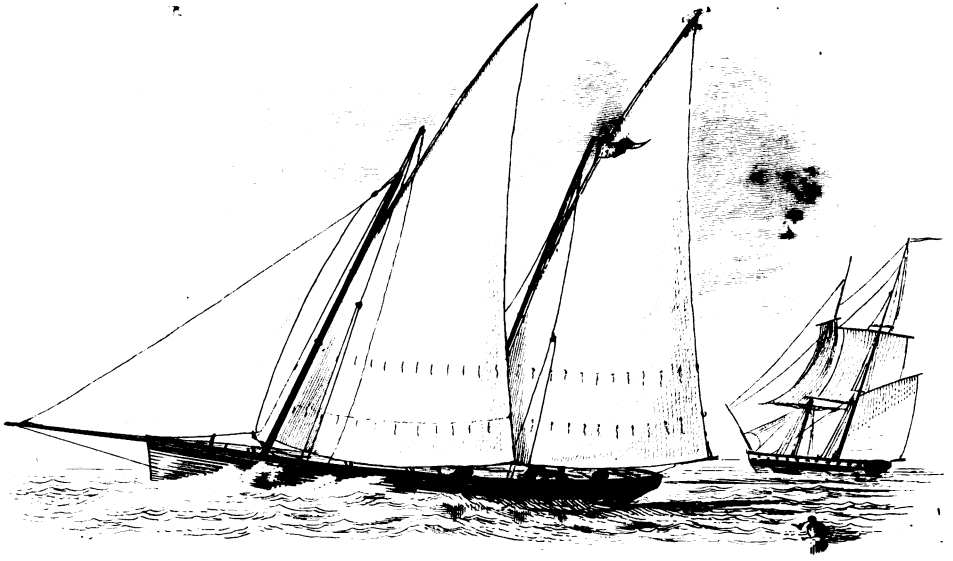

SLIDING GUNTER.

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lateen sail, but is set differently, the lower part of the main-sail of a sliding-gunter being laced to the mast, whereas the whole of a lateen sail, from peak to tack, is laced to a long yard. The sliding-gunter has a short mast, but a long pointed yard, the upper part of which stands high above the mast, though parallel with it, and is contrived so as to slide up and down the mast by means of two iron travellers, called gunter-irons.

Either one, two, or three masts and sails of this rig, may be fitted to a boat. The opposite engraving represents a two-masted sliding-gunter; and such are more commonly used than single-masted. The sliding-gunter is one of the safest rigs possible for open boats, and for general convenience it is almost unequalled; and this probably accounts for its being a favourite rig for first-class ships' boats. And it is, besides, one by which the sails may be quickly set and as quickly furled: the masts being low, they are very convenient for unshipping, in case of using the boat for rowing; reefing this sail is also easily and effectively accomplished, the widest part, or that having the greatest pressure on the boat, being shortened to such an extent, that two reefs will generally take up nearly half the sail. No better rig can be used for open boats in bad weather; and in fine weather, no rig looks prettier for a pleasure-boat than a two-masted sliding-gunter. The sail should be well peaked up, and the luff laced close to the mast and yard.

The following dimensions and calculations for rigging and fitting a pleasure-boat or ship's pinnace upon this plan may be relied on; they have all been carefully tested, and are therefore appended with confidence, as an accurate guide to any one who may be desirous of fitting out a two-masted boat, of the size stated below, upon the most approved sliding-gunter plan.

Dimensions of Boat, Spars, &c.

Length of boat over all .	28 feet 0 inches.
Length on keel . . .	26 „ 6 „
Greatest breadth of beam .	7 „ 4½ „

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Fore-mast stepped	5 feet 4 inches from stem.
Main-mast	17 „ 0 „ from do.
Length of fore-mast	20 „ 2 inches, from head to heel.
Length of fore-yard	18 „ 0 „
Distance between the gunter-irons	4 feet.
Diameter of fore-mast (top)	3½ inches.
„ „ (bottom)	4½ „

Length of main-mast (head to heel)	17 feet 3 inches.
Length of main-yard	19 „ 8 „
Distance between gunter-irons	4 „ 0 „

Diameter of main-mast same as fore-mast.

Length of main-boom	15 feet 0 inches.
Diameter do.	0 „ 2½ „

Diameter of fore and main yards, 3 inches at the stoutest or lower part; 2 inches at top.

Length of bowsprit, from tip to heel	11 feet 6 inches.
Do. part housed	4 „ 6 „
Diameter of bowsprit, at gammon	0 „ 3½ „
Tapering at the tip to	0 „ 2 „

The bowsprit may be run through the gammon, in the usual way, and the heel secured as in other boats.

The lower ends of the yards, from four feet downwards, should be at least three inches square, tapering gradually from the upper gunter-slide to the heel; the tapering to be on the aft side only, leaving it the same width, but reduced in thickness down to an inch and a half: by this means the sail is brought closer to the mast, and stands better, less gap being left under the yard than when kept of the same substance. The gunter-irons should be covered with leather, or at least the circular part which slides up and down the mast; the square into which the yard is fitted should be of flat iron, one inch deep, with one or two small holes for screws to secure it; the square for the upper iron should be three inches dia-

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meter, the circle five inches—the two being connected by a strong short neck, well welded into the other parts; the lower iron must be of the same sized circle, but the square, three inches athwart-ships, and only one and a half inch fore and aft. There is considerable strain upon the neck of the upper gunter-iron; it is therefore very important to have it strong and well made.

Dimensions of Sails.

Main-sail luff or fore-leech	26	feet	0	inches.
„ aft-leech .	25	„	5	„
„ foot . .	12	„	10	„
Fore-sail luff or fore-leech	27	„	0	„
„ aft-leech .	28	„	3	„
„ foot . .	11	„	0	„
Jib luff or fore-leech .	15	„	0	„
„ aft-leech . .	10	„	6	„
„ foot . .	8	„	3	„

There should be seven cloths in the foot of the main-sail, six in the fore-sail, and four and a half in the jib, each worked to twenty-two inches. The fore-sail and main-sail should be secured to the yards by a small marline, which answers better than grommets; but from the lower iron of the yard downwards to the tack clew a running lacing is best, and will be found most convenient for casting off when about to trice up the tack; small metal thimbles must be worked into the luff of these sails, to facilitate the working of the ratline, when fitted with a lacing. The brail-rope, if overhauled by a boat-hook, will serve as a tack tricing line; and the fewer ropes the better: those necessary are,—a single rope for jib-halliards, which should reeve through a small block hooked to the mast-head; fore and main-halliards, which should consist of a single whip-purchase, one inch; and a tye of one and a half or one and three-quarter inch. To one end of the tye a single block must be spliced to receive the whip-purchase, the other end is rove from the fore side through the sheave-hole at the mast-head, passing through the upper ring of the gunter-iron, and round

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the neck of the lower gunter-iron, seizing it to its own part just above, between the yard and the mast; a seizing should also be passed round the neck of the upper gunter-iron, to secure it to the tye. An eye must be spliced into one end of the whip-purchase, and passed over a flat-headed bolt in the fore part of the thwart, to which the mast is clamped; the bolt answers the purpose of a cleet, and serves to belay the halliards when the sail is hoisted.

A single rope on each side the mast will answer for shrouds, which, by being brought a little forward of the mast, will also act as a stay.

The brails, which catch the sail under the throat, in the same manner as for a sprit-sail, should lead through a small block or a bull's-eye strapped to the lower side of the lower gunter-iron; the brails will also answer the purpose of down-haulers, if required, and trice rope, as before mentioned. A single gun-tackle purchase is proper for fore and main-sheets; the upper or boom sheet-block must have an eye-strap large enough to admit the outer end of the main-boom as far as the shoulder, which is left on the boom about one foot from the aft end, as a stop to the main-sheet block-strap.

The best plan of setting the main-boom for this rig is, by pointing the aft end so as to fit into the clew of the main-sail, in the same way as a spreet fits into the peak eye of a sprit-sail; the inner end of the boom is then secured by means of a lanyard rove through a half sheave in the boom end. By this method the goose-neck is dispensed with, and the foot of the sail may be stretched taut, and will stand as flat as possible without lacing to the boom. It must be observed, however, that on setting sail, the same care must be taken to keep the foot of the sail taut as is necessary in setting a sprit-sail, or the shaking of the sail, when the boat is in stays, may cause the clew to slip off the boom end; but a little practice soon renders this easy.

For a small open boat the *single* sliding-gunter, with fore-sail and Bermudian mizzen (as shown in the woodcut on opposite page), is a remarkably pretty, useful, safe, and handy rig. With regard to the sliding-gunter rig generally, those

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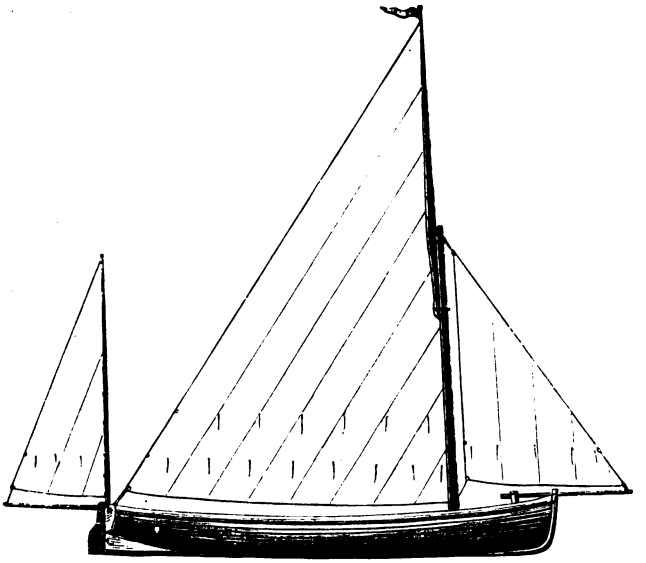

Sliding Gunter.

parts of the gunter-irons or travellers which slide up and down the mast must be large enough to travel freely, so that the sail may be hoisted and lowered expeditiously when necessary.

The main-halliards should be secured at or to the heel of the yard, or under part of the lower gunter-iron, and from thence, leading upwards in a groove cut on the inner side of the yard, and then through the square part of the upper iron traveller, from which through a sheave-hole or block at the top of the mast.

It should be observed, with regard to the gunter-irons, whether for a single or two-masted rig, that the upper traveller may be made so as to be readily detached when the yard is lowered; the advantage of which is, that the yard may then be stowed with the sail on the top of the boom (where one is used), in the same way as the gaff of a cutter's main-sail.

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A very little ingenuity on the part of the blacksmith who makes the gunter-irons will accomplish this. It simply requires that the part of the upper iron traveller which goes round the mast should be fitted with a hinge and clasp, or trigger, so as to hold or lock the traveller firmly to the mast, and to be unfastened and detached from the mast for the purpose of unshipping the yard before stowing the sails.

For a small open boat, however, in which the mast is unshipped after the yard is lowered, and the whole are then laid lengthwise in the boat after sailing, there is no necessity for the hinged gunter-traveller.

THE REVOLVING RIG.

THIS singular, but ingenious, mode of rigging boats and small yachts, is the invention of Mr. Molyneux Shuldham, of the Royal Navy,[1] who kindly furnished the Author with drawings, models, and other original information, developing the whole scheme and peculiarities of one of the most remarkable methods of rigging vessels and boats ever invented. As the invention has never been fully explained, or made known to the public in any other treatise, I am authorised by the inventor to publish a brief history of the revolving rig, showing its originality, and success under repeated trials at Woolwich and elsewhere, together with such information as I am enabled to give from personal observation of the boat itself, when under the able management of its inventor, in Harwich Harbour, and on the rivers Stour, Deben, and Orwell. Many years ago, the revolving rig was frequently submitted to public and practical tests, and was entirely successful under various trials, which called forth letters and reports from some of the most eminent officers in the Navy, all acknowledging the extraordinary capabilities of boats rigged on the revolving plan. In August 1835, His Imperial Highness the Grand Duke of Tuscany

(1) The Author regrets to add that Mr. Shuldham has died since the publication of the preceding edition of this work.

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presented the inventor with a valuable ring set with brilliants, as a mark of the high opinion his Highness entertained of the revolving rig.

The invention of a revolving mast appears to have originated entirely with Mr. Shuldham, and has not been adopted by any nation. The Navy Board were at fault in their endeavours to find out the non-originality of it; the Chinese boats bore the nearest resemblance, some of which have a shear-mast which revolves on part of a circle.[1] Mr. Shuldham's first notion was to contrive the rig of a boat so as not only to sail well, but to be easiest handled. He conceived the idea that the most perfect sail would be that which would stand as flat as a board, and be a moveable plane with its axis on a line with it, and which could be placed in any position so as to receive the fullest or the least effect of the wind's power.

It was supposed, when the yacht 'America' entered our waters, in the year 1851, that no Englishman had ever thought of lacing sails to booms, and making them stand as flat as boards; but it is a plan Mr. Shuldham seems to have adopted from his earliest experiences. On reference to the sketches and documents entrusted to my care, I find that upwards of fifty years ago he rigged a vessel precisely like the late Mr. Steven's celebrated yacht the 'Maria,' of the New York Yacht Club, viz. a sloop with only two working sails, main-sail and fore-sail; the fore-sail or jib (for it may be called either) was laced to a boom, which was found very convenient, enabling the inventor to work to windward without any help, merely by leading two fore-guys, within reach at the helm. Mr. Shuldham discontinued the rig on account only of his having found it very troublesome in a heavy squall; this may not, however, be so in Mr. Steven's well-manned yacht, but the other was short-handed.

One gentleman, a captain in the Navy, in his report upon trials of the revolving rig, says, that 'for squalls, for con-

(1) Vessels fitted with tripod masts, which revolve on part of a circle, are common in the Indian Archipelago. (See *infra*, Foreign Boats.) The Soolo Pirate Boats are also rigged with a shear-mast. The Ancient Egyptians also used a shear-mast, *ante*, page 13.

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venience in reefing, and readiness in lowering the sail, I declare it to be the handiest rig I ever witnessed.' Another captain in the Navy, on reporting a trial which took place at Brighton, adds: 'I saw the plan tried here; and although the vessel it was tried upon was built for stowage, and not for speed, and she was leaky, and very objectionable as a trial vessel, yet, under these disadvantages, she went clear to windward of all the fast-sailing crafts which were opposed to her, and fully established the superiority of the plan, as presenting a means of effecting a windward passage with greater speed and certainty than any vessel of the rigs hitherto in use.'

The principle of the invention, as shown by the engraving on the opposite page, consists of two or more spars affixed to a base turning upon a strong iron pivot, the upper end of the spars being secured by a cap, so that the whole machinery of mast and sail depends for support on an iron spindle, stepped in an iron socket on the keelson. The original invention was confined to two spars only for the mast, which is all that is necessary for small boats; but for those of six tons and upwards, three or more spars, fixed as a tripod, will answer better, and add stability and safety to the working of the boat, as the mast then supports itself, and takes all the strain off the boom.

For larger, or decked boats, a topmast may be fitted, and a jib-headed topsail used to great advantage in light winds; also a ring-tail boom and stern-sails, for running before light winds.

The boom and bowsprit must be contrived of two separate spars, and may extend as far over the stem and stern of the boat as a cutter's boom and bowsprit, but with considerable spring at each end; the main-sail, fore-sail, and jib are maintained as one sail of triangular shape, laced all the way along the boom, and spread by a tough yard. The sail, when properly made, should stand just as flat as a board, and without a wrinkle; and as it moves *with* the mast, and not around it, is never deranged from its drum-like surface.

At right angles with the sheer, and on the revolving base, are fixed two iron rests, in which the boom lies; these serve

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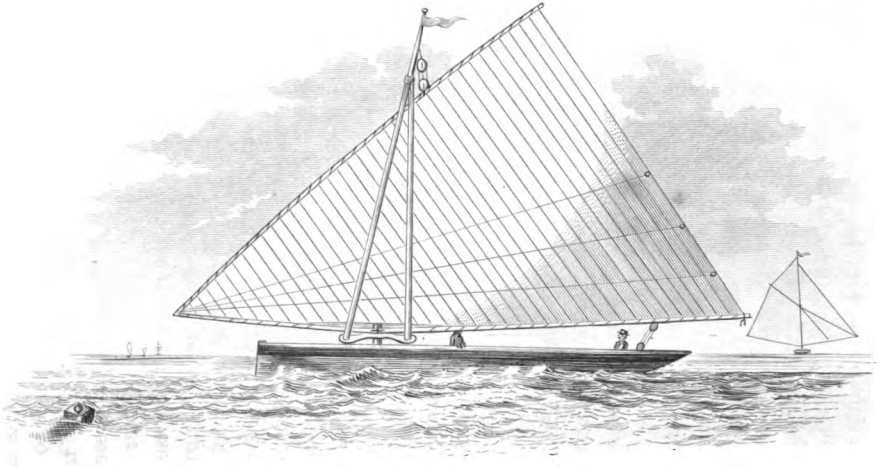

REVOLVING CLIPPER.

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to keep the outer ends of the boom up. The aft rest should be much higher than the fore one, so as to keep the boom from dipping in the water, when lying over in a breeze. The fore end of the yard is hinged to the fore end of the boom or bowsprit by means of an iron joint or goose-neck; the reefs are formed in radiating lines along the sail, from the fore end of the boom to the aft-leech of the sail.

With regard to the due proportion of spars for the triangular sail, the boom should be three-fifths of the whole, and the bowsprit two-fifths; but for a lug-sail, the bowsprit should be a trifle more than one-third of the whole length. If there be less area of canvas forward, then the strain on the sheet, in sailing before the wind, would be greater, which it would be well to avoid.

The slings should be placed on the main-yard, about two-thirds of its length from the fore end, leaving only one-third to extend abaft the mast; by which means it is impossible for the peak of the sail to sway to leeward, as the peak of a cutter's main-sail; it being kept in a direct angle with the boom, thereby defying any bend of the yard or belly to the sail. The length of the yard must be exactly three-fourths the length of the boom and bowsprit, so as to preserve a central pressure under every increase or reduction of sail.

The bowsprit should be loaded at the outer end with lead, run into it to counterpoise the weight of spars and sails to leeward. This may appear, at first sight, an injudicious plan; but when carefully considered, it is not only practicable, but very ingenious.

The masts are supported in various ways, according to the tonnage of the vessel. In open boats, a flat revolving mast, without rigging, will answer. For decked boats, or small vessels, a wooden or iron pivot supports the whole strain. In larger vessels, rollers are affixed to the circumference of the revolving base, which work between two circular sweeps or rings, firmly secured to the gunwales and deck, supporting the whole strain in every direction.

A very strong double or treble block is required for hoisting the revolver's sail; and this may be readily inferred, when it

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is remembered that the revolver's halliards are in lieu of the main, gaff, fore-sail, and jib-halliards of a cutter. The purchase should, therefore, be strong, and one that will overhaul easily. The shears should be let into the mast-head with great nicety, riveted to it, and well secured with hoops.

In the engraving facing page 76 the revolving base is shown above the bulwarks; this has been done for the purpose of explanation. The revolving base is not of necessity fixed so high in the boat; on the contrary, in several of Captain Shuldham's boats the revolving base was hidden below the bulwarks, and the shears only were seen above the gunwale.

In rigging and fitting a revolver, the novice is advised not to deviate in any essential particular from the instructions here given, as Captain Shuldham tried every conceivable plan, before perfecting the invention; and his best and most approved notions with regard to the rig are here stated.

As a warning to any one who may venture on the experiment, it may be mentioned that a boat-builder at Norwich, wishing to rig a boat upon the revolving principle with such deviations from Mr. Shuldham's plan as were considered improvements, actually made the boom *to droop aft*, in order to obtain the benefit of low canvas; the consequence was, that the first squall the boat encountered laid her boom in the water, and she was upset.

It may be, that the rig would look much prettier if the boom might be rigged so as to hang in a horizontal line, parallel with the surface of the water; but after many and repeated experiments, the inventor found such could not be accomplished in the revolver, consistent with the safety of the boat.

It is one of the *main features in the revolving rig* that *both bowsprit and boom should incline upwards at the outer ends*, as shown in the engraving.(1)

(1) The Author regrets that the engraving of the revolving clipper in the first and second editions was inaccurate in that respect; he therefore substituted *an entirely new plate* for the third edition, with a carefully executed engraving; the sails and spars being shown in proportionate length, and upon a proper scale.

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The inventor once tried the experiment of a revolving sail, made to *fit a yard of the same length as the boom*; the consequence was, that with one reef down, the boat carried an unpleasant weather helm; with two reefs, an increased one; and with three, she could hardly be kept from luffing into the wind's eye; but by making the yard about four-fifths the length of the boom, the centre of the wind's pressure upon the sail was the same in a longitudinal direction under all reduction of canvas. This experiment at once convinced the inventor of the absolute necessity of maintaining a due proportion in the revolver's yard and boom.

As to the Management of Revolving-rigged Boats.

A revolving-rigged boat, when understood, is easily handled, but it requires another kind of seamanship, constant attendance at the halliards and sheet; for when the latter is let go the sail points itself head to the wind. What sailor would suppose that the quickest way of putting a revolver about would be by easing off the main-sheet? And what sailor would dream of sailing or laying a vessel to—*stern foremost?* Again, what sailor would suppose a vessel could be 'hove-to' with all her flying kites set, with the wind abeam on the quarter, or nearly right aft? And what sailor would imagine that it was a good plan to place some of the vessel's ballast at the end of the bowsprit? And, again, what sailor would suppose that a vessel having *no way* upon her, could be put about? However, all the above have been tried and proved, over and over again—the inventor not having discovered them all at once, but by much experience. As the power is at will to carry as little sail as possible, and also much more than any other rig can possibly carry, a great deal of revolving seamanship must depend upon judging what amount of sail should be carried with prudence.

Many of the peculiarities of the revolving rig, at first sight, will strike the novice as curiously at variance with all other methods. One singular evolution belonging to the rig is, that the vessel may actually be hove-to with all sail set and the

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wind abeam or on the quarter, and kept in that position during pleasure; which is a great convenience when wishing to stop the vessel suddenly, to avoid collision or to allow of a boat's coming alongside to shift a passenger or goods from one to the other. This may be done, and way given again to the revolver, in a few seconds.

The vessel may be laid-to with her stern to windward, or may be sailed stern foremost. A two-masted revolver, when close-hauled, might, in case of emergency, be guided or put about, without the aid of a rudder, merely by a slight sway of the sail.

By the revolving method the dangerous practice of jybing the sail is optional, and may be entirely avoided, the whole being worked by means of a bridle, both ends of which are made fast to the fore end of the boom; thus the sail can be twisted on its axis, bringing it fore and aft, or at right angles with the keel, with great velocity.

The revolving rig will answer for almost any description of sail. The shape is not limited to any one particular form more than another: the lug or any other sail can be worked on the revolving principle with equal facility.

For vessels navigating intricate channels or crowded waters, the revolving rig is peculiarly adapted, as the vessel may be almost instantaneously stopped, by all sail being reversed.

In the event of getting aground, the revolver's sails may all be thrown aback in an instant, to help her off; it may, therefore, on such occasions, be found very convenient to sail a vessel stern foremost.

Another important feature is, that the shear-mast may be easily and quickly lowered, without the necessity of unrigging or deranging a single rope, or unbending the sails; a great consideration and convenience for passing under bridges.

A large spread of canvas can be set in running before the wind, and may be reduced with less labour, more simply and expeditiously, than by any other mode.

Again, the nicety of its balance renders it impossible to be

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taken aback, and the worst apparently that can happen is, that the sail may fly fore and aft, or point itself to the wind. To the many advantages before stated, may be added the quickness and certainty of staying, either in a sea-way or in smooth water, the facility in wearing, and the small compass in which the evolution is performed.

There are one or two modes of reefing revolving sails, to which it may be well to call attention.

The first, and best, is by lacing the foot of the sail to a flat board, painted white, to correspond in colour with the sail; this board is pivoted at both ends, and works in two iron stanchions at the extremities of boom and bowsprit, so as to be turned easily; it is provided with self-acting catches at each end, so that a reef can be taken by merely a half-turn of the board, and by several turns the sail may be speedily furled. (1) By turning the board the reverse way, the reefs may be shaken out: the halliards must be slacked during the performance. If a sail of triangular shape is to be reefed in this manner, the reef-board must also be triangular.

Another method of reefing quadrangular and triangular revolving sails is without any reef-board or roller, but by lacing the reefs with an endless rope, a pull of which will reef the sail on a small scale, and a few pulls on a large one.

The working of the revolving sails by means of the long sheet or bridle requires some little experience, but, when once learnt, is simple and perfect. One end of the sheet should be made fast to the extreme end of the bowsprit, and rove through a single block at any convenient distance from the aft end of the boom; the other end of the sheet should be passed to the end of the bowsprit, and made fast there, leaving as much slack in the sheet as to belay the bight, when the boom is squared or at right angles with the boat's hull. In wearing without jybing the sail, the sheet must be eased off or let go when the boat is nearly right before the wind; whilst the boom is swinging over head, the man at the helm must lay

(1) This mode of reefing sails appears to be very similar to that adopted by some of the islanders of the Indian Archipelago. (See *post*, 'Malay Jellores,' &c.)

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hold on the other part of the sheet, and haul through quickly, which gives a bridle on the *other* side of the boom, forming both a fore-guy and a sheet, which may be belayed or not.

In addition to the bridle, a short main-sheet might be used for working to windward, the standing part made fast amidships; and the fall, leading through a single block affixed to the boom, can be instantly unrove in bearing up to run before the wind. The short sheet will be found convenient, although unnecessary, the bridle being sufficient to answer every purpose.

When sailing close-hauled, in a shear-masted revolver, the topsail only can be set, in addition to her large sail, because the others cannot be made to stand equally flat with them. It is in sailing with the wind on the quarter or abaft that the advantage of additional sails will be felt.

The greatest objection to the revolving rig seems to be the room which the revolving base occupies in the boat.

The invention of the revolving rig was for many years patented; the patent, however, expired in the year 1839.

SLIDING AND REVOLVING KEELS.

Admiral (then Captain) Schank was the inventor of sliding keels, and there are several models of his invention in the United Service Museum.

Captain Schank's invention was publicly tested in the year 1791, on the cutter 'Trial,' and highly laudatory reports thereon were made to the Admiralty. Captain Schank also, about that time, published a treatise on the subject.

The revolving keel, which is in some respects a modification or improvement upon the sliding keel, was invented by Mr. Shuldham, when prisoner of war at Verdun, in the year 1809; the model then made by him is deposited in the museum at Ipswich, Suffolk; a model was also exhibited in London, at the Adelaide Gallery, about the year 1829.

It has been asserted that revolving keels have been common in America for many years past. *Centre boards* are, in fact,

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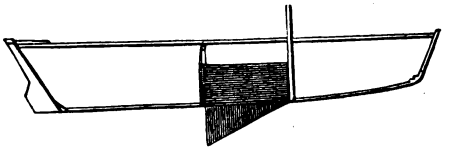
nothing more than revolving keels; the probability is, that the idea of the revolving keel or centre board was taken from



Section showing Revolving or Centre-board Keel.

Mr. Shuldham's model in the Adelaide Gallery, and about that time found its way across the Atlantic. The revolving keel is necessarily quadrangular in shape, whereby it can be raised or lowered without injuring the boat by its leverage or twisting strain. Totally different from the sliding keel, it works or revolves upon a single pivot or bolt through the fore part of the keel, by which means the liability of getting jammed is avoided, particularly when required to be worked in haste. The keel itself, in Mr. Shuldham's invention, is *lead*, which works in a water-tight wooden case, lined or ribbed with copper or zinc, for the purpose of adding strength to the case, keeping the keel clear of the woodwork, and decreasing the friction.

In the American models, the centre-board keel is of a very hard and heavy kind of wood, shod with metal. The leaden revolving keel is adapted only to decked boats; for all open boats and small craft the revolving keel should be of wood. A heavy lead or iron keel would render a small boat unsafe in a sea-way.

The revolving keel is raised and lowered by means of a keel-rope passed round a sheave fixed to the upper part of the keel, which gives a double power; to the keel-rope a tackle is affixed, consisting of a very small four-fold and a treble block, which will increase the power to twelve. By this means a keel weighing 5 cwt. and upwards may be raised and lowered with facility by the man at the helm, the utmost extent of raising being up to the deck beams, which just brings its lower edge even with the keel of the boat. The centre of gravity is thus vertically moveable at pleasure.

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The advantages of centre boards, sliding and revolving keels, are many: in the first place, a great depth of keel may be put on the boat, which is of infinite service in turning to windward, particularly with flat sails. When running before the wind, the keel may be drawn up, and the boat will travel much faster than with the keel down. In case of running sharply aground, the keel performs the part of a buffer, and saves the boat from damage. It may be well to mention here, that whatever be the mechanical power employed for raising the keel it must be so contrived as to move upwards with the keel, when lifted by the boat running aground, on which occasion the vessel vibrates on a central point, so that without difficulty her head is placed off shore, when, after raising the keel, the boat glides off into deep water.

One of the objections to centre boards, sliding and revolving keels, in regard to their general adoption in yachts and pleasure-boats, used to be that they absolutely divided the boat into two longitudinal halves, the keel-case coming up quite to the deck, which rendered the boat unfit for many purposes.

That objection is, however, now easily obviated by modern ingenuity, and the keel-case in boats of English construction comes up no higher than the level of the thwarts, and the top is fitted with a water-tight cap. In the very shallow boats of American construction, however, the keel-case must of necessity rise higher, those boats being so very shallow, and all but flat-bottomed.

For a flat-floored sailing-boat, or a small racing craft, or any other where speed is the main object, the centre board or revolving keel is invaluable. So also for a shooting yacht, it being often necessary to go into very shallow water in order to obtain a shot at wild-fowl. It has been said that the strength of the boat is materially weakened by cutting away the backbone and floor timbers. A boat, therefore, intended to be fitted with a centre-board, sliding, or revolving keel, should be built expressly for the purpose, that proportionate strength may be given to allow room for the keel-case, without weakening the keelson.

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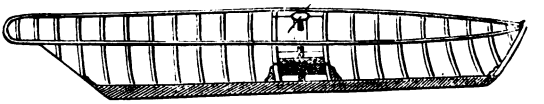
REVOLVING BALLAST.

THE system of raising a portion of the ballast, by means of a powerful screw apparatus for drawing the ballast up to the deck beams, so as to alter the centre of gravity at pleasure, is another of Mr. Shuldham's inventions; the plan is very useful for steadying vessels in a sea-way, and preventing them from rolling so much as when all the ballast is under the floor. It should only be hove up when running before the wind; but as this method is better explained by illustration than profusion



Section of Boat, showing Screw, with Ballast partly raised.

of words, the diagram above will more clearly elucidate the subject.

The lump of lead or iron ballast, thus moveable, should be secured in a strong wooden or iron case, the screw passing through both. This method of raising the ballast enables a vessel to run lighter and faster before the wind, particularly in a heavy sea; when *on* a wind, it must be lowered. There is a model of a revenue cutter in the Society of Arts Repository, for which Mr. Shuldham was awarded a silver medal, for an ingenious method similar to this, but so contrived that, when the vessel heeled over thirty degrees, the ballast lowered itself. The revolving lead keel answers every purpose of raising and lowering ballast, and is in some respects superior to, and more simple in contrivance, than the revolving ballast.

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CENTRE-BOARD SAILING-BOATS.

(See the Engraving on opposite page.)

CENTRE-BOARD sailing-boats have been common in England since the year 1852, when a little boat, of about three and a half tons admeasurement (named the 'Truant'), was sent over to this country from New York to compete with our English sailing-boats; and on so doing showed such a superior capacity for working to windward and scudding, that she became an object of considerable attraction and observation.

This celebrated little clipper was fitted with a centre-board keel; (1) and as regards the form of the boat, it was constructed upon the most approved lines of the New York boat-builders, which were totally different to those of any kind of boat which had previously been seen in English waters.

Since the period alluded to, centre-board sailing-boats have become popular in this country. The form of the American boat is *very* broad and *very* shallow, with a wide and powerful stern, and sharp hollow bow. Some of these boats were so shallow that, when on the river Thames, they were termed mere 'skimming dishes.'

For boats of a deep and narrow form of hull, the centre-board keel is unsuited; it is, in fact, best adapted for boats of a broad and shallow form.

The form and rig of the centre-board boat of the present day are purely of American invention. English boat-builders improved upon it, and in the result they turned out some very excellent boats, in which the American 'skimming-dish' style of hull is considerably modified; and boats of a less shallow form have been constructed with remarkable success.

The rapidity with which an American centre-board boat may be tacked and turned up to windward in narrow channels, and the facility with which it may be run over shallow waters, are truly astonishing; but it is best adapted for smooth water.

One of the great advantages in a shallow-bottomed boat is,

(1) See a description of centre-board keels, and the mode of working them, *ante*, page 83.

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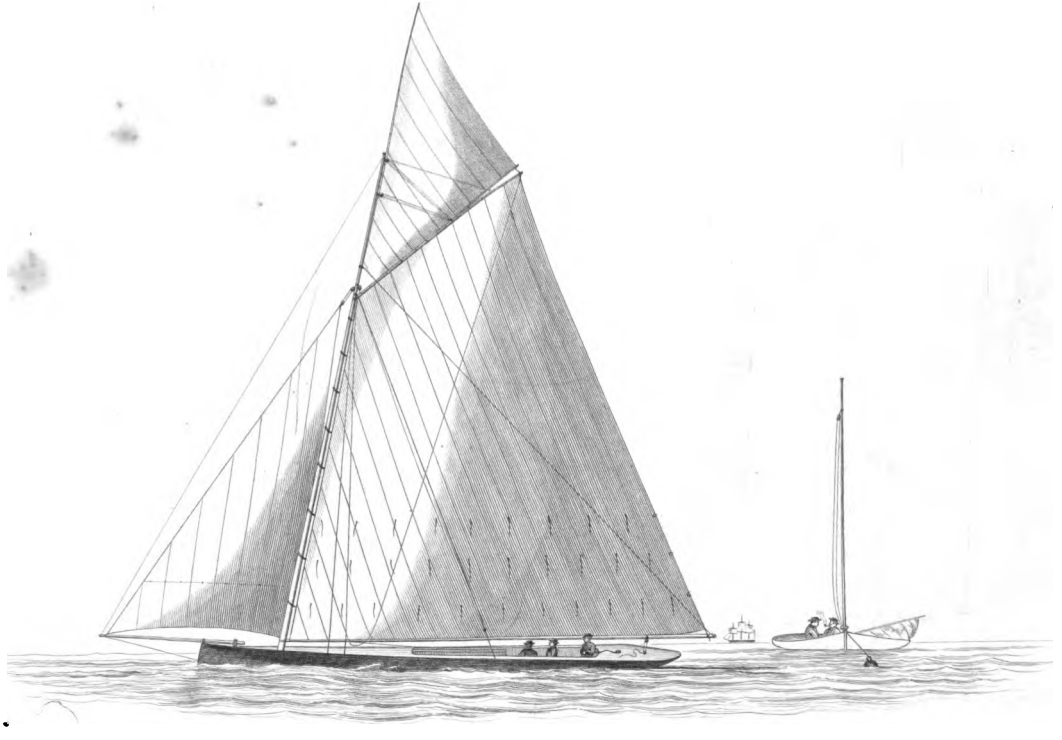

SLOOP-RIGGED CENTRE BOARD.

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that in shallow tidal waters there is seldom any risk of running aground; whereas, with a sharp, deep-keeled boat, it is sometimes impossible to avoid the risk of being left on the shallows in that ludicrous predicament in which the poet Moore found a sailing-boat and crew, when he penned the beautiful couplet:—

'I saw from the beach, when the morning was shining,
A bark o'er the waters move gloriously on,
I came when the sun o'er that beach was declining,
The bark was still there, but the waters were gone.'

An American centre-board boat, although very broad and shallow, has fine lines both fore and aft. The bow is sharp and even hollow, both above and under water, and the stern is neatly rounded, but nearly as broad as the midship section. There is very little keel, except the centre-board keel, which, as regards the part hanging below the keelson when let down, is triangular in shape, or like the fin of a fish.

The whole fabric of the boat is so broad and shallow that the middle part is nearly flat-bottomed, although the bow is sharp and fine at the entrance.

The rudder is of necessity very broad at the lower part.

As to the inner part of the boat, it is decked nearly all over, leaving only a sort of *well*, or steering place, at the broadest part round about the keel-case, where also there are thwarts or benches for the crew.

The case containing the centre-board keel is fitted at about one-third of the boat's length from the stern. There were formerly many objections to centre-board keels, such as their liability to get out of order by being choked with sand, mud, or seaweed, the room they occupied in the boat, dividing the open part into two longitudinal halves, and the difficulty experienced in keeping the keel-case water-tight; but these and other such objections have been overcome by the mechanical ingenuity of modern boat-builders.

There are various ways of rigging these boats, such as cutter, sloop, yawl, and otherwise; but the most usual is the sloop rig, with the mast stepped very far forward—in fact, close to

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the stem—and the sails, a large gaff-mainsail and a stay-foresail. (See the preceding engraving). In heavy winds the fore-sail is dispensed with, and the boat is sailed under a reefed main-sail only.

These boats are easily handled, and will come about under main-sail only, when the mast is stepped as far forward as above described.

TRIANGULAR YACHTS.

SOME few years since a remarkably curious boat, called the 'Problem,' was exhibited by the inventor, Mr. Henry Dempster. The hull of this vessel was of triangular shape, the stern-post being made to rake at the same angle as the stem, so that both met and terminated in a triangular point under water, and thus formed simply an angular keel. This model yacht was twenty feet in length, and six feet beam; was iron built, and ballasted with lead. It was rigged with three masts, the main-mast being placed exactly in the centre, and in an upright position; the fore-mast had considerable rake forward, and the mizzen-mast the same proportion of rake aft. Two square sails were set on the main-mast, one above the other, and a triangular sail on each of the other masts. These triangular sails were on a revolving principle, the booms being each secured at the centre of gravity, one to a pivot on the stem and the other to a similar pivot on the top of the stern-post, by which means they would turn round and round, clear of the masts, and could be trimmed to any degree upon a circle. The sails thus possessed a double advantage, and, with the help of the triangular hull, could perform many rapid revolving evolutions, which no other boat could so quickly accomplish. Among other experiments by the inventor, was a very remarkable one, tested at Newcastle, by driving two stakes into the ground at low-water mark, to which a strong iron bar was lashed horizontally, in a similar manner to a leaping-bar. A pole or gauge was then erected alongside the stakes, marked to feet and inches, to indicate the depth of water.

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When the tide had risen sufficiently high to show that there was one foot and a half less water than the 'Problem' required to sail clear of the obstruction (consequently that the vessel would strike it with her angular keel), she was sailed *stem on* at the bar, a stiff breeze blowing at the time; she then went over it by *rise* and *fall*, similar to a horse jumping a gate. The performance was repeated several times, in the presence of a large assemblage of spectators.

The advantages of a triangular hull (as stated by the inventor) are, that a vessel might be made particularly useful for narrow rivers, where much turning in a small compass is often necessary; but it will only answer in deep water, and the vessel must always be kept afloat—in fact, such a vessel could not lie aground. It has also been suggested that the invention is well adapted for trawling and fishing boats, and, in fact, for any vessel where much turning is required.

The invention of a triangular hull has not, at present, been carried out in any other vessel than the inventor's 'Problem.' The inventor has often expressed his desire of building and fitting trawling and fishing boats upon the same principle, and with a large well for live fish, upon a novel and ingenious plan; and he was sanguine as to the ultimate success of such vessels in the fishing trade, but he informed me that, from unavoidable circumstances, he was not able to carry out his wishes.

Models and plans of Mr. Dempster's invention of this ingenious kind of fishing boat, with well, &c., complete, and curious mode of rigging, are exhibited in the Model-room for Nautical Inventions, at the Kensington Museum. (1)

(1) See also an amusing little work, recently published by Mr. Dempster, entitled 'The Decked-welled Fishing Boat,' &c., 1868.

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TWIN SAILING-BOATS.

THERE can be no doubt as to the invention of twin sailing-boats having originated with the native islanders of the Western Pacific. No mention is made of such contrivances by any of our ancient authorities; whereas our earliest voyagers speak of the double canoes they met with in the Indian Archipelago, and also of boats furnished with outriggers, and other such ingenious appendages, for the purpose of enabling vessels of a narrow form of construction to carry sail safely. Some of the twin canoes of the remotest islands are most ingeniously contrived. (1) The idea of placing two boats of a narrow form side by side, at a few feet apart, and securing them in that position by means of a platform placed over both, whereby the stability of the one is preserved by the counterpoise of the other, is, to say the least of it, an ingenious contrivance, from which great and useful results might be produced.

Within the last few years, several attempts at twin boats, and boats with outriggers, have been made in this country upon the principles of those of the Indian Islanders; but the designers have generally been disappointed in the results of their inventions, as far as regards their sailing powers, for the reasons, probably, that the English system is too heavy and elaborate for fast sailing, as compared with the matchless contrivances of such twin boats as the flying proa of the Ladrone Islands, the double canoes of the Feejee Indians, and the sailing canoes of Ceylon.

SWAN BOATS.

SAILING-BOATS built in imitation of a large swan with its wings extended, though a great curiosity even at the present day, are of great antiquity, and have been already alluded to in the early part of this work, under the head, 'Boats of the Ancients.' (2)

(1) Most of these are described and illustrated in subsequent pages of this work.

(2) *Ante* page 4.

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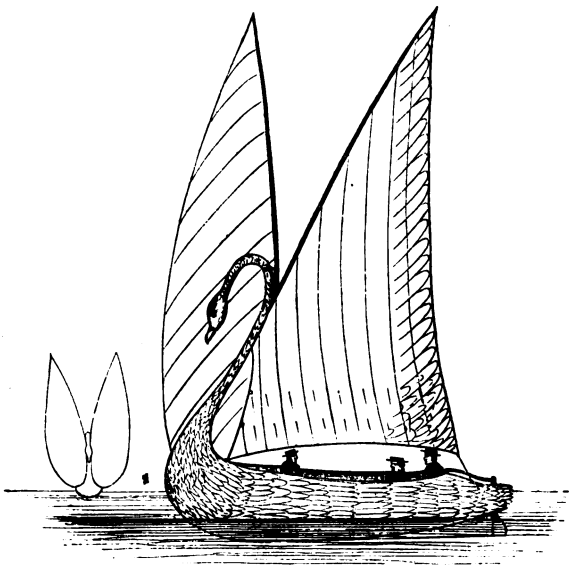

Swan Boats.

In shape, the body of the swan forms the model of the boat, the neck the mast upon which the sails are hoisted, and, in some instances, the rudder is made in imitation of the foot of the swan. The sails are also made to resemble the extended wings of the swan. They consist of a single lateen, or rather a settee-shaped sail, when sailing with a side wind, and of two such sails when running before the wind.

The chief object to be attained in these boats is to make them resemble as closely as possible a large white swan; and with a little ingenuity on the part of both boat-builder and sail-maker, this may be accomplished.

In the first place, if in building the boat the body of the swan be kept strictly in view, a very broad-beamed, safe, and roomy boat will be the result; the fore part should be covered over so as to represent the shoulder or lower part of the neck of the bird, and yet to form a fore-cabin, and the aft part should also be covered over, so as to represent the rump of the swan, and to form an aft-cabin or sail-room.

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The central or main part of the boat should form the principal cabin, which, though partly uncovered when the boat is in use, still, when the hatches are closed, the top should resemble the back of the bird.

The sails should be made to look like the extended wings of the swan, and, if properly cut and well made, will have precisely that appearance when viewed at a distance; and this whether sailing with a side wind, in which one sail only is used, or scudding, when both sails are set. After the sails are made, they may be painted at the aft-leeches in imitation of the outer feathers of the swan's wings; a few slight touches with a paint brush and dark paint will suffice to render the imitation a striking one.

Both sails are hoisted by means of halliards rove through small brass blocks at the top part of the neck of the swan, separate halliards being used for each sail.

These boats, when ingeniously constructed, and the sails and tackle properly arranged, always look like veritable swans, whether under sail or not. Even when at anchor, with sails furled and lying along the back, the resemblance, at a distance of a hundred yards or more, is very remarkable.

Boats of this kind have occasionally been built, though more for curiosity's sake than otherwise. There is at the present time (1870) a very fine and perfect swan boat at Starcross, in Devonshire. Most people who have stopped at the railway station at Starcross, between Exeter and Dawlish, must have noticed from the carriage windows of the train, the swan boat and its little auxiliary, the 'Cygnet,' both of which are generally to be seen in that neighbourhood, or may be heard of on inquiry at the inn there, called the 'Courtenay Arms.'

The engraving of swan boats at the head of this article was not, however, taken from the Starcross boat, but is from a design of my own.

A boat of the kind, fitted with a centre-board keel and stanchion gun, might probably answer very well for wild-fowl shooting.

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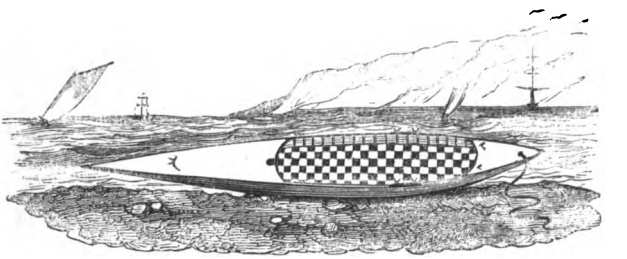
BOATS FOR WILD-FOWL SHOOTING.



The Gunning-Punt. (1)

THE engraving represents a round-bottomed gunning-punt, useful both for sailing or paddling, after the Author's own invention.

A wild-fowling gunning-punt, for the purpose of carrying one individual sportsman, with a punt-gun, ammunition-box, shoulder-gun, and other requisites for punting, should be just large enough to be safe and serviceable, but nothing more. The smaller the boat is made to appear on the water, the greater will be the punter's chance of success, the more convenient it will be to manage, the quicker he can make up to birds, and the less will be the exertion necessary to propel it.

The size of a wild-fowling punt, however, must be in some proportion with the size of the gun intended to be used, and also in proportion to the height and weight of the punter himself.

The most useful sized punt-gun for general purposes is that carrying about half a pound of shot at a charge; and as there are more punt-guns in use on the coast of that size than any other, the recommendation would seem to be confirmed.

A punt to carry a gun of the size stated, with a man of ten

(1) See the 'Wild-Fowler, a Treatise on Ancient and Modern Wild-fowling, Historical and Practical,' by H. C. Folkard (2nd ed.).

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or eleven stone weight, should be of the following dimensions:—

Length over all . .	17 feet.
Breadth, amidships . .	2 feet 10 inches.
Ditto, ditto, at bottom .	2 feet 8 inches.
Depth at bows . .	4 inches.
Ditto at stern . .	8 inches.

A boat of this description may be built either with a flat bottom or a flat floor: the distinction being, that one is perfectly flat, as the bottom of a box—which is termed 'flat-bottomed'—the other, though said to be 'flat-floored,' is built more like the bottom of a skiff, i. e. clench-built; and the sides do not commence from an angle, as in a flat-bottomed boat, but are round, as a whale-boat, though it is a great desideratum to maintain the floor throughout as flat as it consistently can be, with due regard to shape; and when ingeniously constructed, such is by far the best form of punt that can be used.

Colonel Hawker, in his work on guns and shooting, condemns all round-bottomed punts, such as were used in the colonel's time at Southampton and Itchen ferry, as on a bad construction; and gives as a reason that they have unsteady bearings.

Now, without disputing the colonel's assertion as to the Southampton and Itchen ferry gunning-punts, it is insisted that the reason of round-bottomed punts having unsteady bearings is, because they are *too* round at the bottom. If they be constructed with a long flat floor, as flat as it is possible to make a clench-built punt, they will be safer, and even steadier, than a flat-bottomed punt.

The punt under consideration should be built with a spring in her bottom, fore-and-aft, of from 1½ to 2 inches; or, in other words, the bottom of the punt, as taken from stem to stern, should form a section of a circle, and this whether a flat or round bottom: the object of which is, that in going into very shallow water, when the bottom of the boat grazes the mud, it may nevertheless be pushed ahead many yards further, whilst a boat without any spring in her bottom would be set fast. This is sometimes a great consideration, when punting

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to birds on the ooze, as the tide flows towards them, when the success of a shot may depend on the chance of being able to push the punt a few yards farther ahead.

The fore part of the punt, from stem to cross-piece, should be covered over with a very thin scantling of deal, adding no more to the weight forward than absolutely necessary, because of the heavy gun which has to be placed there.

The cross-piece alluded to is placed just abaft the scantling, and marks the balance for tipping the gun.

The covered part of the punt may be finished with a semicircle, if the punter attaches any regard to appearances; and the edge should then be completed with a neat semicircular piece, rising an inch and a half or two inches from the scantling-deck, which affords a sufficient screen to the punter when making up to birds.

Another cross-piece of light wood should be placed athwart the gunwale, about $2\frac{1}{2}$ or 3 feet from the stem, before the scantling is put on; this is for the purpose of fixing the rest for the outer end of the barrel. The rest should be a simple copper screw, with a small semicircular crutch in which to receive the barrel. It should be made in connection with a female screw, attached to the fore cross-piece; and the male screw should be of sufficient length to raise or lower the elevation of the gun from one to two inches.

As to the position of the chock, or strong-piece, to which is attached the necessary apparatus for checking the force of the recoil, it must depend entirely on the means intended to be employed. If the patent spiral recoil-spring is to be used, the interior of the punt must be fitted accordingly. But if the strain is to be thrown upon the stem-piece, the builder must take care to fix the same strong enough to receive it.

The fore parts of gunning-punts are sometimes left quite open, and without any scantling or fore-deck; but, when so constructed, they require to be rather deeper at the bows than the dimensions stated on opposite page.

The gunning-punt may be built entirely of fir, or the upper strakes which are above water may be of fir and the lower

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ones of elm; if all fir, the boat will be so much the lighter, and more buoyant. A gunning-punt should never be built of oak; it is too heavy for the purpose. Many punters express astonishment that Colonel Hawker should have recommended such a material. During the latter days of the colonel's sporting career, however, he appears to have given preference to elm and fir.

The only objection to clench-built gunning-punts with round bottoms is, that in a breeze the ripples on the water make a trickling noise against the planks of the punt, as it is propelled forward, called, in nautical language, 'tell-tales;' (1) that is to say, the noise tells the helmsman of a breeze springing up.

The author once heard an objection raised to clench-built punts, the punter stating that, but for the 'tell-tales,' he could have heard the birds feeding, and so discovered their whereabouts; whereas the noise of the water rippling against his clench-built punt, not only precluded him from so doing, but frightened the birds, and caused them to take wing. But the statement appears scarcely feasible, because, by resting a moment on the paddles, the 'tell-tales' are silent, and they certainly cannot be heard by birds beyond forty or fifty yards' range. I have never found the smallest inconvenience myself from the 'tell-tales;' though a remedy may easily be found, if necessary, by substituting a carvel for a clench-built punt.

It is desirable that there should be no farther projection of the stem of the punt beyond the muzzle of the gun than is absolutely necessary; and this depends, in a great measure, on the form and construction of the punt, and may be materially provided against by continuing the floor as flat and far forward as possible, so that it may be more buoyant under the heavy weight of gun-metal, which depresses the head of an ordinary punt. The muzzle of the gun should never extend beyond the stem of the boat. (2)

(1) This must not be confounded with 'tell-tale,' a portable mariner's compass.

(2) For fuller information as to gunning-punts, the mode of using them, and wild-fowl shooting generally, the reader is referred to the 'Wild-Fowler,' by H. C. Folkard.

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There is a slight difference in the form and build of gunning-punts at various places around the coast.

The Hampshire punts have round sterns, and are short and narrow, the length being but fourteen feet, and the breadth at gunwales from two feet six inches to two feet eight inches, according to the size and strength of the punter. The recoil of the gun in the Hampshire punt is received by a rope breeching, rove through a strong wooden knee, firmly fixed across the bottom planks of the punt, a little in advance of the gun's balance; and this method is also adopted in other counties, as the strongest place in the punt on which to throw the force of the recoil, though it may well be doubted whether the stem is not the best place through which to reeve the breechings, and receive the strain.

The eastern coast gunning-punts are of considerable reputation, particularly those in the neighbourhood of Maldon, in Essex, the form of which is much in favour with those who resort to the pursuit of punting in winter as a means of subsistence.

The form of the Maldon gunning-punt is very similar to a coffin, simply flat-bottomed, with nearly upright sides, formed of two broad strakes. The usual length is sixteen and a half to seventeen feet, and the breadth two feet eight inches to two feet ten inches. They are very handy for setting to birds, because of the narrowness of their form, enabling the punter to use his arms freely, and, by means of the paddles, with considerable effect; but they are easily upset, and require very great care on the part of the occupant in all his movements. They have strong gunwales and cross-piece, and are the least costly of any gunning-punt that can be built. When intended for an extra-large gun, they are built in proportion—longer and wider—as may be required.

In loading the gun whilst on board one of these punts, it is usual to row ashore, or lash the punt alongside a larger vessel.

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Two-handed Gunning-Punts.

Two-handed gunning-punts, or those constructed to carry two persons, are seldom used at the present day. Many years ago, when wild-fowl resorted more numerously to England, and were less wild than now, two-handed punts were more general. But they have too formidable an appearance on the water to allow of much success; and although manned by two persons, they make slower progress through the water, and are much more sluggish to propel than single-handed punts. One man sits or kneels at the stern, in a most cramped and uncomfortable position, and sculls with an oar, whilst the other lies down to attend the gun; and if his arms are long enough to reach across the boat (which must of necessity be much wider than a single-handed punt), he assists with the paddles in propelling the boat towards the birds.

The advantages of two-handed punts are, that they carry a larger gun than others; sometimes a full-sized stanchion-gun, which throws from one and a-half to two pounds of shot at a charge, making fearful destruction among large numbers of wild-fowl, and, when loaded with mould-shot, they sweep the water from sixty to one hundred and twenty yards, spreading terrible slaughter among the feathered tribe.

The gun is generally fitted so as to be 'tipped' with the facility of a smaller one; and flying shots are often made just as the birds rise from the water, the man at the helm turning the boat skilfully with his oar in the direction taken by the birds when rising in the air. (1)

The Sailing-Punt.

The sailing-punt enables the wild-fowl shooter to obviate a good deal of the hard work which he must necessarily encounter in a rowing-punt; and it is, besides, the most eligible boat for approaching wild-fowl in shallow water by daylight. It must be observed, however, that it is not every punt that can be sailed: a boat of peculiar and special construction is

(1) *Vide* the 'Wild-Fowler.'

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required for the purpose; for, so surely as an inexperienced hand attempts sailing an ordinary rowing-punt, such as is used for wild-fowling, so surely will he capsize himself. Of all the forms of gunning-boats, the punt is the least safe under sail, and the least manageable. A punt must be built specially for the purpose of carrying sail; and it may be so constructed as to be capable of being used either as a sailing or rowing-punt, and so that a strong man, with long arms, may propel it with paddles nearly as fast as an ordinary rowing-punt. And such is precisely the description of boat recommended, which, after trying several different forms, the Author used many years, and found it not only a most comfortable, but serviceable boat for the purpose; and it looked no larger on the water than a rowing-punt.

The length of the sailing-punt, from stem to stern, should not exceed eighteen feet (if it be intended both for rowing and paddling), and the extreme breadth amidships three feet three inches, gradually tapering from the midship section towards the stern, and finishing with an upright stern-piece; the fore-part of the punt should also taper gradually from the midship section to an upright stem-piece. The depth forward should be four-and-a half inches, and aft eight inches.

Neither water-decks nor wash-streaks are required for the sailing-punt, because no reasonable man would venture to set sail in so frail a bark in rough water.

The mast must be a shifting one, so that it may be readily shipped and unshipped at pleasure—a light piece of spar, about the size of a mop-handle, and from four to five feet in height. The mast-stepping hole may be made either through the scantling in front of the screen-piece, or just abaft it, and a little towards the left side, so as to be clear of the balance-rest on which the punt-gun lies. Neither shrouds nor stays should be fitted to the mast: either would make it dangerous, because, should a heavy squall strike the sail, it is better for the tiny mast to go by the board, carrying all sail along with it, than to capsize the boat, which would be the result, under such circumstances, if the mast were confined. It is preferable, therefore, to select a slender mast, that has not sufficient

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substance to overturn the punt. Never mind its bending in a strong breeze; the carrying away of a mast now and then is far less to be regarded than the upsetting of a punt. The punt's mast must be fitted at the top with a small metal sheave for the halliards, which, after being led through the sheave-hole, are attached to an iron or copper traveller, sliding up and down the mast; and a thumb-cleat being tacked on to the lower part of the mast, just above the punt's deck, all is ready for making fast the halliards whenever the sail is hoisted. The sail should be of a broad lateen or settee shape, and made of very light duck or white calico. It is unnecessary to give the exact dimensions of the sail, as they must be in suitable proportion to the stability of the punt; but, as a general rule, the lateen-yard for spreading the sail may be fifteen feet for a punt of the size and length described. (See engraving which faces page 101.)

The rudder-bands must also be sufficiently long to enable the sportsman to steer his craft when lying at full length on the floor of the punt.

No other ballast will be required than that of the punter himself (who is virtually *the ballast*), the punt-gun, ammunition box, and other accoutrements; all of which must be placed in exact position, so as to trim the boat to a nicety. If the sail is lightly made and fitted, and fairly proportioned, the punt will be quite safe in smooth water, in experienced hands. But *one* sail only should be used, and that the lateen before mentioned. The rapidity with which a little boat of this kind skims along on a reach is astonishing, and the young sportsman will often be agreeably surprised at the easy and unsuspecting manner in which it may be run up to wild-fowl in a steady breeze; and if a shot cannot always be obtained before they take wing, by luffing the punt whilst they are rising, in the same manner as with a yacht or sailing-boat, an excellent flying shot may frequently be made.

It is not the strength of the wind, but the roughness of the water, which produces the danger; for if the water be smooth, and the punt built according to the directions here laid down (with keelson and flat long floor), sail may be carried fearlessly

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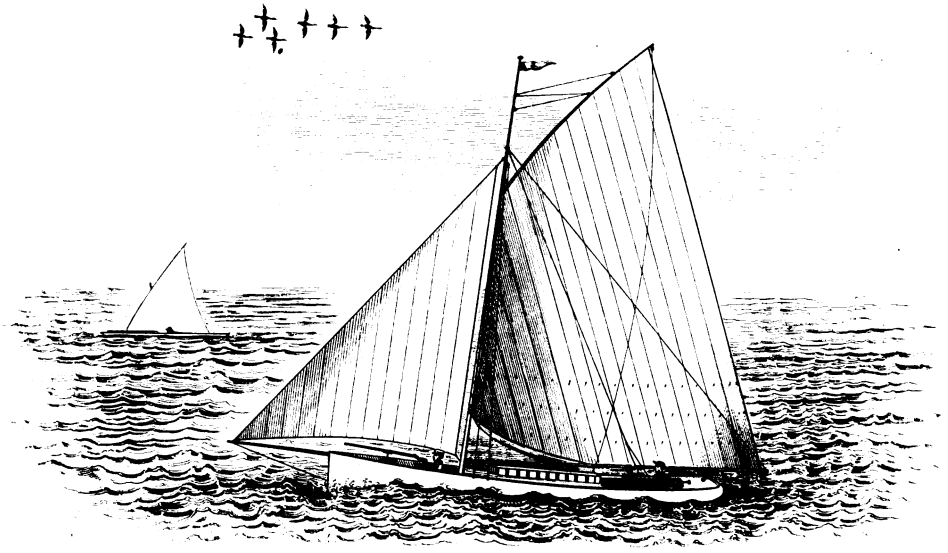

SHOOTING BOAT.

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in an ordinary, and even a stiff breeze. But the inexperienced are warned against the peril of carrying sail on a punt in any but smooth water. The effect of venturing into rough water with a long low craft, whilst pressing her ahead under sail, would be to drive her bows under water; and the weight of the gun on the head of the punt must tend to increase the danger. If the punter moves forward to lower the sail, his extra weight, thrown suddenly forward would, in such a case, inevitably send the punt under water head first; and, independently of such a glaring indiscretion, it is impossible to prevent the water from flying over the gunwales in a heavy sea. Therefore, the wild-fowler is cautioned *not to venture into rough water with the sailing-punt*, for a sportsman's life is supposed to be of more value than that of a duck. (1)

The Sloop-rigged Shooting-Boat.

The sailing shooting-boat is used for wild-fowl shooting in large rivers and shallow bays, where the shooting-yacht is precluded from proceeding, because of drawing too much water. Thus the shooting-yacht and stanchion-gun are used for sea-going purposes, and the open sailing-boat, with gun of equal proportions, for inland waters and shallows.

A boat for this purpose should be about twenty feet in length by seven feet beam; a shallow craft, with powerful bearings.

Stability is a great desideratum in a boat required for this diversion. It is not desirable that the boat should list on her side too much when under sail, as it interferes with the management of the stanchion-gun. A narrow deck-way of ten or twelve inches may be formed on each side of the boat, which should have no bulwarks; but the deck-way should be upon a level with the gunwales. The fore and aft part of the boat may also be partly covered in by a flush-deck, but in other respects it should be entirely open.

A boat of this description will require several hundred-

(1) See further and more fully in the 'Wild-Fowler' as to sailing punts, and mode of using them.

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weight of iron ballast, which must be deposited with careful discretion beneath the platform.

The stanchion-gun should be fitted with chock and necessary recoiling apparatus upon the flush-deck at the bows; and must be placed so as to swing clear of the fore-stay, so that a shot may be fired from either bow.

The best form of rig for this boat is the 'sloop rig' (see engraving), by which the fore-stay, instead of being made fast to the stem, stands farther out to the extreme end of the standing bowsprit, thus giving more room for the sportsman to work the stanchion-gun clear of ropes, and enabling him to place it in a more advantageous position.

Probably no better form of boat could be invented for traversing the shallow waters of inland bays and rivers, the sorert of wild-fowl, than an American centre-board boat. (1) Such a craft would carry the stanchion-gun well. The keel might be lowered at pleasure, or when beating up the channel of a river or in deep water; whilst the shallow form of the boat would enable the sportsman to go over almost any ooze or sand-bank with facility where there might be a depth of one or two feet of water.

The Wild-Fowl Canoe.

This is a small boat, about twelve feet in length by three and a half in breadth, and about fifteen inches deep in the fore part by ten inches in the aft. It is clench-built, in a similar manner to a skiff, and with a keelson, but as flat in the floor as it is possible to make it, because of the occasional necessity of going into shallow water. The canoe is intended to carry two persons and a dog; it is used for the purpose of going up creeks and under the banks of oozes at low water; also when the tide is sufficiently high to bring the top rim of the bows of the canoe upon a level with the surface of the ooze; when the sportsman may sometimes make a very successful shot.

The manner of using the wild-fowl canoe is as follows:— When the sportsman has discovered wild-fowl feeding on the

(1) See *ante*, page 86.

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savannas, he places himself on his knees in the fore part of the canoe, rests the barrel of the gun on the bow of the boat, and in that position remains as motionless as possible, whilst his companion cautiously sculls the canoe, with one oar, towards the birds. For this purpose a sculling rowlock is fitted to the centre of the stern piece, through which the oar is thrust; and the bows of the boat being higher than the stern, the movements of both men are concealed from view, and effective shots are sometimes made, particularly on moonlight nights.

When not actually approaching wild-fowl, one person sits facing the prow, to look out for sport and give directions to the other, who rows the boat with a pair of sculls, up creeks and rills, or wherever there may be a prospect of sport.

SHIPS' BOATS, ETC.

ALL large vessels are required by Act of Parliament to carry a certain number of boats. A first-rate man-of-war has six boats attached; but in merchantmen and other trading vessels the number of boats is regulated according to tonnage. Ships' boats are classed under the heads—pinnaces, launches, gigs, barges, quarter-boats, jolly-boats, cutters, and long-boats.

The Pinnace, which is the largest of all, is generally from twenty to thirty feet in length, with proportionate breadth of beam. These are often fast-sailing, powerful boats, and are enabled to carry a great number of hands. There is no definite rig for the pinnace: two lug-sails are those most generally used. The sliding-gunter ([1]) is also a rig frequently used for the pinnace. The masts of all ships' boats are made to *strike*, for convenience of stowage. The pinnace is rowed with ten or twelve oars, doubled-banked. Vessels going very long voyages carry decked pinnaces. When stowed away on deck, the pinnace is usually turned bottom upwards, and laid over the barge.

([1]) *Ante*, page 68.

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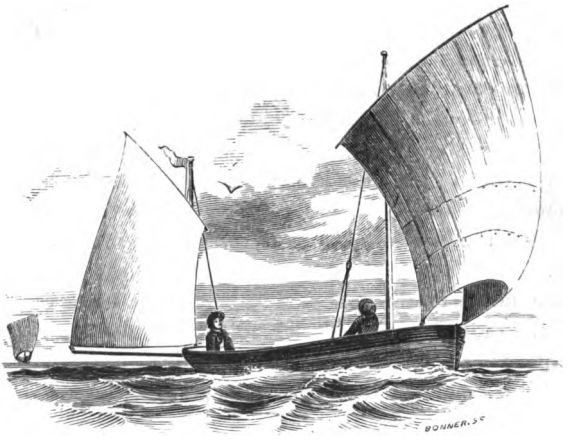

Quarter-Boat.

The Barge.—Ships-of-war carry a large boat of easy draught of water, called a barge; it is generally very strongly built, and capable of accommodating a large company. The barge is occasionally sailed, but, being broad and heavy, is not usually so fast as other boats belonging to the ship.

The Launch.—This is a strongly-built boat, with very considerable breadth of beam, and very flat floor. It is used chiefly for carrying on board the ship's provisions, water, &c., for convenience of which several of the thwarts amidships are fitted in such a manner as to be readily shifted, shipped, and unshipped. A lug-sail is used when required. The launch, when belonging to vessels-of-war, is occasionally half-decked, and equipped with a large gun at the bows, and with other arms.

Quarter-Boat.—Large vessels generally carry two quarter-boats, which are suspended one on each side, over the ship's quarters, by davits. They are used by the officers and crew, and are well-built and useful boats; sometimes they are called first and second cutters. A common rig for a quarter-boat is two lug-sails, viz. main-lug and mizzen-lug, as shown in the above engraving.

The Jolly-Boat is strong, short, and clumsy-looking; used

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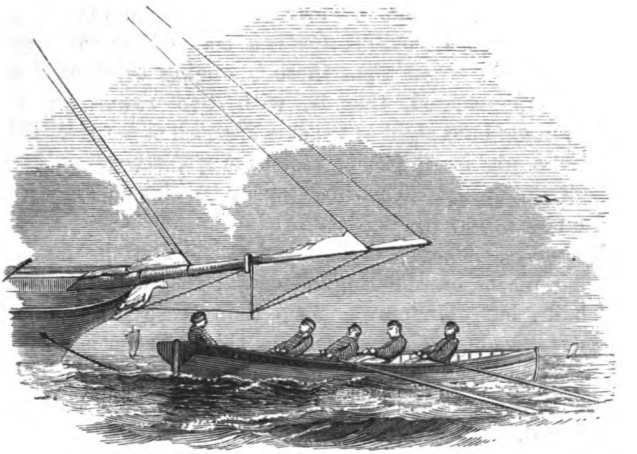

The Captain's Gig.

by the crew for running out the kedge, working the vessel in narrow waters, taking the sailors ashore, and other rough purposes. It is pulled with four oars.

The Long Boat is generally hauled up on deck, and laid bottom upwards, for use in cases of emergency, danger, or shipwreck; it is long and capacious, and belongs chiefly to trading vessels not requiring so large a boat as the pinnace.

Gigs and other Small Boats.

Gig.—A boat of superior form, in shape resembling a well-built skiff, but longer and larger; an exceedingly smart-looking craft, varying in length from sixteen to twenty feet and upwards, and from three to six feet in breadth. It has a sharp bow and graceful proportions. Every large vessel carries (amongst others) a boat of this description, called the captain's gig (see engraving), which is sometimes very tastefully decorated with brass mountings, gildings, mahogany backboard and fittings. The captain of a large vessel is generally very particular as to his gig, which is always the fastest and handsomest boat belonging to the ship; the sails are kept in

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good order and are of snowy whiteness. The captain selects the best rowers from the ship's crew to take him ashore in his gig.

The Gentleman's Pleasure Gig is a boat of the same form, but often much larger than those belonging to ships. It is rowed double-banked, that is, with two rowers on each thwart; sometimes eight or ten oars are used at a time. When sailed, the gig is rigged in various ways, according to the fancy of the owner. These boats may be classed among the handsomest of our rowing-boats.

Beach Gigs.—These are employed at most of the favourite watering places on the English coast; they are strong and well built, but of narrower form than those previously described. Beach gigs are sometimes thirty feet in length, and only three in breadth. No other than a small lug-sail is used in narrow-shaped gigs, and that but seldom; they are generally rowed.

The sea-going gigs used in the coast-guard service are sometimes called galleys; they are superior boats, strongly built, and from twenty to thirty feet in length, and four or five in width; but some are much narrower. When sailed, the general rig is one or two lug-sails. In reaching and running with the wind free, few open boats can beat them, the coasting salvors or Yarmouth yawls excepted.

The Cutter (rowing-boat).—The term cutter, in its general application, signifies a decked vessel of superior speed. There is, however, a small kind of boat used by the officers of large ships, called a cutter, in form similar to a gig, but with a sharper bow, whilst the beam or breadth is in proportion to that of a skiff. The cutter is a light little boat, and very fast, both for rowing and sailing. It is sometimes sailed with a sprit-sail and fore-sail, but more generally with a lug-sail. Fast rowing gigs, with very sharp bows, are also sometimes called cutters.

The Skiff is a small light boat used on every lake and river in England. The skiff is so well known as to need but few remarks in explanation. It varies in size from ten to sixteen feet; all boats of similar shape exceeding that length are termed gigs, wherries, ships' boats, &c.

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A skiff sixteen feet in length would have about five feet breadth of beam. No boat is of more general use than the skiff, both for sailing and rowing, for pleasure and profit; it is sometimes termed the 'sailor's cradle.'

The Dingy.—A short, light, little skiff, very much the shape of a walnut-shell; it seldom exceeds ten feet in length, and is an accompaniment to small yachts and fishing vessels, to which it usually serves every purpose of long-boat, jolly-boat, gig, &c.

Galleys.—A galley signifies a boat of a long and narrow form, propelled by several oars. The wager-galley is exclusively a rowing-boat, long and slender in shape, lightly built, with a low hull and very sharp bow, rowed by four, six, or eight oars, according to length.

The Oxford and Cambridge eight-oared galleys are probably the lightest and most scientifically constructed rowing-boats in the world. They are made from a solid tree of mahogany, or the best white pine, hollowed and formed with great skill, so that the sides are scarcely thicker than the edge of a half-crown piece, being afterwards strengthened internally with transverse ribs of tough wood. Light iron out-riggers are fitted to the sides, and stand out several inches beyond the gunwale, so as to give greater leverage for the oars. An eight-oared outrigger of this kind is from sixty to seventy feet in length, and from two to two feet four inches in breadth at the widest part.

Thames Wherries.—Of all wherries in the world none are so beautifully modelled or so light and graceful as the 'trim-built wherries' of the Thames. They are constructed upon the most scientific and approved lines, the numerous boat-builders daily endeavouring to outvie each other. These boats are truly a pattern for all nations, and are the especial admiration of foreigners, particularly the smaller craft, adapted for a party of five or six. They have a beautiful sharp bow, with graceful proportions, carrying the beam well aft, or gradually flaring from the bows, and finishing with a neat tapering stern. A chair-rail, for a support to the back, is prettily arranged round the stern-sheets, where the company sit.

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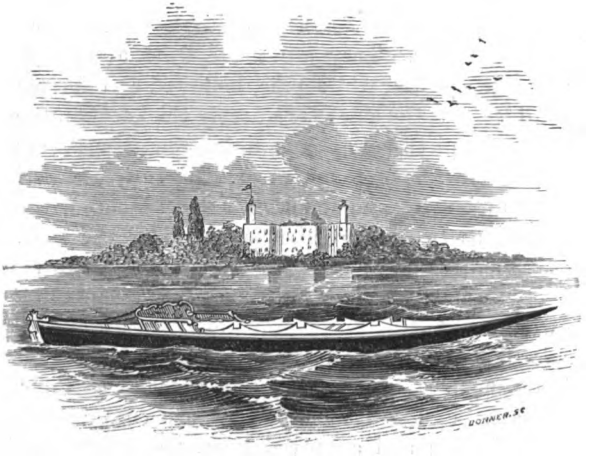
Before the introduction of steamboats on the Thames, wherries were the chief means of conveyance for passengers; but those were of larger size, and some were sailing vessels, very inferior in shape to the smaller boats of modern days.

There are also numerous other rowing-boats, of various light forms, in daily use on the Thames, and at other places. Among them may be mentioned funnies, randans, gondolettes, &c. &c., many of which are of light and beautiful form and construction.



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THE PETER-BOAT.

Hark! I hear a gentle splash, there's life upon the stream—
Yes! yes! a whisper too methinks, or is't Dame Fancy's dream?
Then softly drifting down the tide, a boat appears in sight;
'Good luck t'ye wily fishermen, this is a "catching" night!'
The peter-boat moves slowly on, the mullet net is spread;
No coarse or bungling snare is that, but soft and fine as thread.
The fisherman may crafty be, his scaly prize to get,
But craftier still the mullet is, that gaily leaps the net.

THE AUTHOR.

THE peter-boat is of very ancient origin—indeed, it is precisely the Roman Amphiprora. Peter-boats are much in favour with the fishermen of the English rivers. There are a few peculiarities in their construction worthy of notice. In the first place, they have neither gunwale nor top rim, and therefore present a very unfinished appearance; the top strake runs in a horizontal line from stem to stern, leaving no graceful fall amidships, nor any other improved lines to strike an admiring eye, but is simply what a fishing boat ought to be—*safe and serviceable.* Stem and stern are alike, after the form of a whale boat, but not so sharp, and not curved or elevated. The object of both ends being thus formed is, that in working the peter-net the boat is as frequently propelled backwards as forwards, particularly whilst hauling. Having no keel, the boat can be turned quickly, and in narrow compass. A well

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for live fish is built into the boat amidships, and divides it into two compartments, the fore part being where the rower sits, the other for the fisherman and his nets. The well is generally about two feet wide at the base, and gradually tapering to one foot at the top, extending the whole width of the boat; the depth of the well is just sufficient to bring it upon a level with the thwarts, and, being covered over, forms a seat in the boat; the bottom of the well is pierced with a number of holes, to admit a constant ingress and egress of water. Fish may be kept alive many days, or even weeks, in these wells, if the boat remains constantly afloat, and deep enough in the water. The stern sheets of the peter-boat are laid higher than in other boats, on account of the quantity of water which drains from the nets; but the division caused by the well prevents the water from getting into the fore-part of the boat, where the rower sits. A small raised bench is placed in the very corner of the stern, on which the fisherman stands erect, when shooting the net; this elevated position enables him to lift the cork-line high, that the net may run out freely.

The Doble (or Doval)

Is flat-bottomed, has stem and stern similar to a skiff, and, when afloat, has more the appearance of the latter than a flat-bottomed boat. The easy draught of water renders this kind of boat serviceable for many purposes for which other boats would be nearly useless; it is especially convenient for approaching shallow shores, and in tidal rivers where there is an extent of flat soil or ooze; and for river-fishing the doble is peculiarly adapted, and more used than any other boat. It is also very convenient for the navigation of narrow creeks, and for approaching the brink of rivers, where other boats of deeper draught of water could not go. When properly built, they are pretty-looking craft, very safe whilst used for rowing purposes, but totally unfit for sailing.

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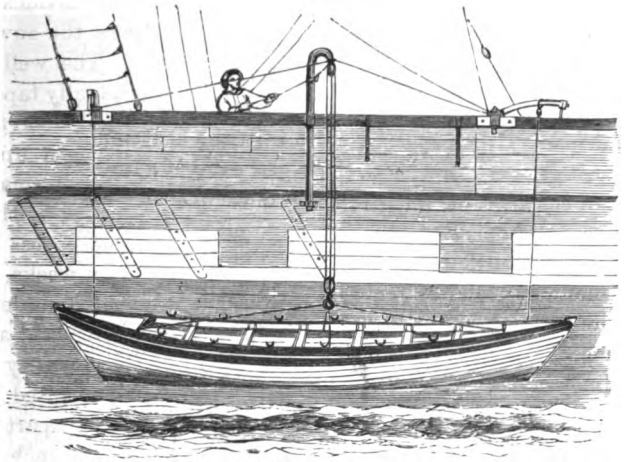

Whale Boat, with Clifford's Boat-lowering Apparatus.

THE WHALE BOAT.

THE South Sea whale boat is strong, but of light and beautiful construction; the head and stern are alike, both being of sharp wedge-like form, and slightly elevated by a graceful curve. It has considerable breadth of beam, and what is termed a very 'flat floor,' with round sides, which render it safe and stiff on the water. These boats vary from twenty-six to twenty-eight feet in length, and are about five feet three inches in breadth of beam. Some are four-oared, others six-oared, and they are generally carvel built. The stem and stern being, as before stated, a little elevated, the boat looks low amidships, but is so buoyant that, with the usual crew of six, the draught of water is but a few inches. The fore part of the boat is covered with strong boarding; a deep circular cut is formed in the inner edge of the boarding, which serves as a rest and support to the headsman when wielding the deadly harpoon. The stern end is also covered in a similar manner; but instead of an opening being cut in the boarding, two very strong wooden chocks or logger-heads are firmly attached, which rise

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about six or eight inches above it; these are for checking the whale-line when the fish tires.

No rudder is used for the whale boat, but a long oar with a wide blade, which is worked in a swivel row-lock at the stern. The long oar gives greater leverage than the rudder, and the helmsman is thereby enabled to turn the boat much quicker, and with greater precision, than by the aid of a rudder—an object of considerable importance in a whale boat. Generally, in the centre (sometimes in the stern) of the boat is a tub containing the whale-line, coiled in the most judicious and careful manner. This line, although small in size, is very strong, and of several hundred yards in length; the leading end is attached to the lance or harpoon, and all is laid clear, the line leading straight along up the middle of the boat, and through a hawse-hole in the stem. The slightest hitch or kink in the line might be attended with disastrous consequences, and would probably upset the boat, when rapidly drawn out by the wounded whale. An idea may be formed of the velocity with which the line runs out from the fact that, if it chafes against any wooden substance, the friction is so great as to envelope the harpooner in smoke; the wood snaps and cracks as if on a blazing fire, and unless preventive measures were used, such as wetting the wood from time to time with a mop, it would ignite. The manner of using the harpoon was, until recently, by throwing it from the hand; but an instrument has lately been invented by which it may be fired from a gun, called a harpoon-gun, a very useful and valuable contrivance, inasmuch as the harpoon may be pitched with great precision at a distance of from one to two hundred yards, and the risk incurred on approaching too near the whale is thereby avoided.

Nicely arranged along the sides of the boat, under the gunwale, are various lances and other weapons necessary for the effectual capture of the whale; all of which, being bright steel and having sharp points or edges, are carefully encased in leather sheaths. The oars are muffled with some soft kind of matting or tow, to avoid noise; if worked in swivel rowlocks, the oars are secured with a lanyard, as they are frequently

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required to be dropped alongside the boat, when they would be lost unless secured. The instant the whale-line slackens, after being run out by a fish, the slack is hauled in and carefully coiled in a tub, as before.

LIFE-BOATS.

To give anything like a history or description of the various forms of life-boats that have been invented in this country of late years, would far exceed the limits of our space; indeed, such a description would fill a volume of itself. It is no exaggeration to say the variety comprises *hundreds*; some of which are very valuable and useful inventions, whilst others are as erroneous in principle as if intended to promote disaster, rather than to relieve it. Still it is only due to those who have spent their time, ingenuity, and money about the invention of safe and serviceable life-boats, to say, that the art is one worthy of the highest encouragement, and the kindest and most humane consideration.

The Royal National Life-Boat Institution is one which deservedly occupies a prominent position among the charitable institutions of this country; the services rendered by that society are highly meritorious, and worthy of the continued and increasing support which has been afforded to it.

Through the medium of that institution (supported as it is entirely by donations and voluntary contributions), life-boats are now stationed at most of the exposed and perilous parts of our coast; and splendid are the services, and brave and noble the deeds, that have been performed in some of those boats by the gallant fellows who man them.

Many years ago, when life-boats were first thought of, several attempts were made before one was constructed that could be relied on. The first invention worthy of notice was by a Mr. Lukin, in the year 1785. But after the disastrous gales on the north coast of England, in the autumn of the

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year 1789, when a great many lives were lost, because of there being no life-boats to put off to the rescue, a prize was offered for the best invention of a life-boat capable of being launched from the shore in safety to the aid of ships in distress. There were several candidates for the prize, which was gained by Mr. Henry Greathead, of South Shields; and in 1790 several boats were constructed upon his plan, which was much approved. Numbers of lives were saved, and noble actions performed in perilous gales, by Mr. Greathead's boats.

In 1802, the Society of Arts, wishing to make an acknowledgment of their approval of the invention, awarded to Mr. Greathead fifty guineas and their gold medal. A grant of £1200 was awarded him by Government, and a similar amount was also presented to him by the Trinity House, 300 lives having been saved off the coast of Tynemouth alone, solely by boats constructed upon Mr. Greathead's plan.

Mr. Greathead's life-boat may therefore be termed the *original life-boat*; some of the recent inventions are improvements upon it. It is made about thirty feet in length, from stem to stern, and twenty feet on the keel; ten feet six inches in breadth, and three feet three inches in depth, amidships. It has very high bow and stern, and both extremities are of precisely the same form, so that it goes through the water with either end foremost; and its shape lengthwise is a curve or crescent, so formed that a line drawn from the top of one stem to that of the other would be two feet and a half above the gunwale at midships. In this boat there are five thwarts, or seats for rowers, double-banked, so that it must be manned with ten oars. It is cased and lined with cork, which gives it such buoyancy that it will float and be serviceable though so damaged by hard knocks as to be almost in pieces; and this the softness and elasticity of the cork is well calculated to prevent. The cork on the outside is four inches thick, and it reaches the whole length of the sheer or side of the boat; on the inside it is thicker, and the whole quantity is about seven cwt. It is firmly secured with slips or plates of copper, and fastened with copper nails. The advantages of this boat are stated to be, that its curvature gives

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great facility in turning, a single stroke of the steering-oars (of which there is one at each end) moving it as though on a centre; that the covering of cork, being immediately under the gunwale, gives great liveliness, or disposition to recover its balance after being suddenly canted aside by a heavy wave; and that its capability of going with either end foremost increases its manageability.

These life-boats continued in use, with a few slight improvements, until December 1849, when twenty of the most skilful pilots of the Tyne were drowned off the coast of Northumberland by the upsetting of a life-boat built upon the same plan. In this case, the boat having no buoyancy, either at the ends or gunwales, it became immersed, and sunk so deep in the water, when bottom upwards, as to leave no space for the crew to breathe; they were therefore drowned inside the boat, which must have been submerged until the water-tight deck at the bottom floated her.

In consequence of so lamentable an accident, and in the absence of efficient life-boats along the greater portion of the coast, and the want of due reward and encouragement to men going off to wrecks, it was determined to make an effort to remedy some at least of those evils; and the first and most obvious step was, the endeavour to introduce as improved and perfect a life-boat as possible. In furtherance of this object, His Grace the late Duke of Northumberland originated a scheme, in order to draw the attention of boat-builders to the subject in all parts of the country; and, with a view of enlisting the best practical skill and talent, through the medium of public competition, his Grace offered a reward of one hundred guineas for the best model of a life-boat which, in the judgment of a committee appointed for the purpose, should combine the most essential qualities for the preservation of life from shipwreck.

Accordingly, in October 1850, a notice to that effect was issued to the boat-builders of this country, which pointed out the chief defects in existing boats, namely, that they had not the actual power of self-righting when capsized, that they did

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not free themselves quickly of water, and that they were too heavy for transporting along the shore. In other respects, the form, construction, and fittings of the boat, were left entirely to the skill and judgment of the builder.

At the same time, a carefully selected committee was appointed to examine and decide on the models submitted.

The result was, that two hundred and eighty models were exhibited at Somerset House, with plans, sections, and explanations of their peculiar merits. With these before them, the committee saw the difficulty that existed of ascertaining, among so many, the relative qualities of each; and various examinations and experiments were made to bring out the peculiar characteristics of each boat. Certain numerals were therefore given to each quality, in the order of importance in which it was regarded by the committee, and which are given in the subjoined standard:—

1	Qualities as a Rowing-Boat in all weathers	20
2	,, Sailing-Boat	18
3	,, Sea-Boat, i.e. stability, safety, buoyancy forward for launching through a surf, &c.	10
4	Small internal capacity for water up to level of the thwarts	9
5	Means of freeing Boat from water readily	8
6	Extra buoyancy: its nature, amount, distribution, and mode of application	7
7	Power of self-righting	9
8	Suitableness for beaching	4
9	Room for, and power of carrying passengers	3
10	Moderate weight for transport along shore	3
11	Protection from injury to the bottom	3
12	Ballast, as Iron 1, Water 2, Cork 3	3
13	Access to stem or stern	3
14	Timber heads, for securing warps to	2
15	Fenders, life-lines, &c.	1
	Total	103

It will be seen by the above formula, that the committee considered it an essential requisite in a life-boat that it should be a good rowing-boat, able to be put off the beach in any weather in which a boat can live at sea, as, without the power

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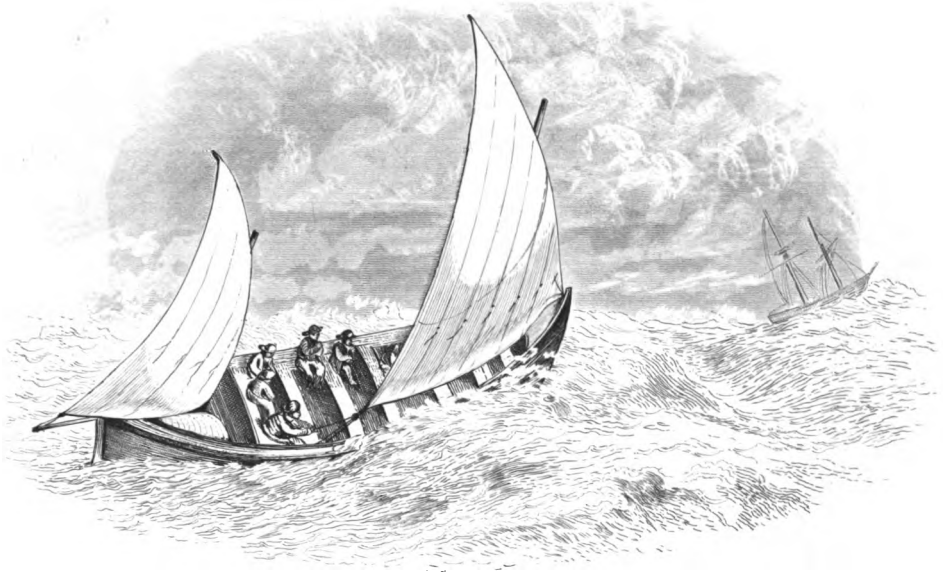

NORTHUMBERLAND PRIZE LIFE BOAT.

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of doing this, other good qualities are of no avail. To this then, was awarded the first number. As on the coasts of Norfolk and Suffolk, where wrecks generally occur on outlying sands, all the life-boats get off *under sail*; and it being evident some of the best models were prepared with this view, it was considered that these also were entitled to be placed on a par with boats built chiefly for rowing; but as rowing is a general practice around the coasts, and sailing an exception, a slight difference was made in favour of the former.

This formula arranged, all difficulty vanished. Each model was again examined, and the number, or proportion of the whole number, according to the merits of each boat, established conformably with the above standard.

It was then decided that the model by Mr. James Beeching, of Great Yarmouth, possessed the greatest proportion of the above requisites, the number being eighty-four of the 103. Six of the best models to which the highest numbers were affixed were then for a third time examined, placed side by side, their points discussed, their qualities canvassed, and carefully compared one with another. The result was, a confirmation of the decision previously arrived at by the committee, who therefore made the award in favour of Mr. Beeching; and he was accordingly declared the successful competitor, and received the Duke's prize.

Beeching's Life-Boat.

(*See the Engraving on opposite page.*)

The following is a description of Beeching's prize life-boat. The body of this boat is of the form usually given to a whale boat—a slightly rounded floor, sides round in the fore and aft direction, a slight rake in stem and stern-post, clench built, of oak, and copper fastened.

Length 36 feet, breadth 9½ feet, depth 3½ feet; straight keel, 3½ inches deep; pulls twelve oars, double-bank; has a cork fender round the outside, below the gunwale. Extra buoyancy is given by air-tight compartments under a deck, and a set of detached air-cases under the thwarts on each

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side, a raised air-tank at each end, and cork fenders outside. Effective extra buoyancy, 330 feet cubic, equal to 9¼ tons. For ballast, a water-tank, divided into compartments, built into the boat amidships, perfectly secure and water-tight. Means of freeing the boat from water in *twelve seconds*, tubes through the bottom. Rig, fore and mizzen-lugsails. To be steered by a rudder or oar, as required. Would carry seventy persons.

The very model that was exhibited for competition has since been deposited in the United Service Museum.

Beeching's life-boats then came into general favour; seven were ordered to be built for the Royal Shipwrecked Fishermen and Mariners' Benevolent Society, besides others for various stations on the coast. Numerous trials were made with some of the boats, and highly satisfactory were the opinions expressed as to their safe and efficient qualities. In many instances the beachmen declared their confidence to be so great in the powers and qualifications of Beeching's life-boats, that they would not hesitate to venture out in them during the hardest gale, or through the heaviest sea.

During the fearful gales of November 1852, these boats were put to several severe tests; but, strange to say, they did not then fully realize the expectations of the public. They had not long been in use, before two were upset during the same gale; one at Lytham, and another at Carnarvon. The accident at Lytham proved fatal to all the crew, save one. Although it was stated that those accidents were mainly attributable to ill judgment, in carrying too great a pressure of sail, it appeared very remarkable, after such extraordinary tests as the boats had gone through and the flattering opinions that had been expressed by so many experienced and scientific men, that two of the first and best of these boats should be upset in such a manner as to be unable to right themselves. About two months after, a third was upset in a similar manner at Rhyl, the boat evidently lacking sufficient power of self-righting; by which disaster six unfortunate but brave young fellows met a watery grave. The subject was then taken into serious consideration, and an opinion demanded from Captain Washington,

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who was requested to enquire strictly into the cause of the accident, and report upon the safety of the boat. The result of that enquiry tended to show the inefficiency of the boat for some stations; but it is much to be regretted that any deviation should have been made from the original model, which, in the opinion of the Northumberland Committee, possessed those essential powers of self-righting, when upset, and which had not been carefully carried out in the construction of the Rhyl boat.

These three successive accidents were alone sufficient to weaken the confidence of the beachmen in Beeching's life-boats, until some important alterations were made in their construction, in order to give them those powers of self-righting which the committee had anticipated on awarding the Northumberland prize to Mr. Beeching.

The use of a life-boat is next to nothing, unless it can command the confidence of its crew; when once that confidence is won, a life-boat is doubly serviceable.

It should not be overlooked, that a life-boat which possesses the power of righting itself, when upset, will be easily upset; that is to say, if it will turn over one way, it will the other. The Shields beachmen say, 'We don't want one that rights herself when she capsizes, but we want one that will not capsize at all.' And so it is, that a life-boat, to command the confidence of its crew, should be so constructed that it be next to impossible to capsize it.

Life-Boats of the Royal National Life-Boat Institution.

The life-boats which have been established on various parts of the coast through the medium of this noble institution now number considerably more than two hundred. The present form of life-boat was designed for the institution, in the year 1861, by Mr. Joseph Prowse; and in it are combined all the best and most approved qualities which it is desirable that a life-boat should possess.

The engraving on the next page will convey a general idea

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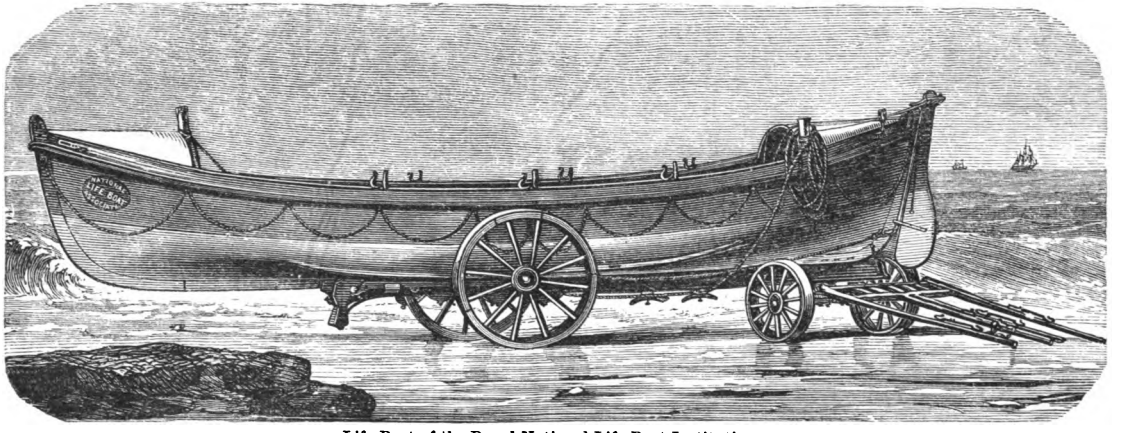

Life-Boat of the Royal National Life-Boat Institution.

Principal Dimensions.

	ft.	in.
Length, extreme, from fore side of stem to aft side of stern-post	33	0
Length of keel wood	29	6
Breadth, extreme, from out to out	8	0
„ at midship line of aft-thwart	7	7
„ at midship line of fore-thwart	7	0
„ at end of each raised air-case	5	9
„ at one-sixth the length from either extreme	5	4
Depth amidships, from under side of iron keel to upper edge of gunwale	3	10½
Depth of stem and stern-post	6	2
„ keel below the rabbet wood	0	1½

	ft.	in.
Depth, from lower edge of iron keel to upper part of flat or deck	2	0
Depth, from inside of skin to upper side of deck	1	6
„ upper side of deck to upper side of thwart	1	2
„ „ thwart to gunwale amidships	0	9
Sheer of gunwales	2	4
Proposed load draft of water—that is, with crew and stores on board	1	10
Displacement at load draft	4½	tons.
Proposed weight of boat when light	53	cwt.
Number of oars, to pull double-banked	10	

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of one of these boats, fully-equipped, on a lifeboat-carriage of the institution, and ready for launching from the beach.

The engravings and plans below show the general form, also the nature of the fittings, and air-chambers, of one of the life-boats of the Institution, thirty-three feet in length by eight in breadth. In figs. 1 and 2, the elevation and deck

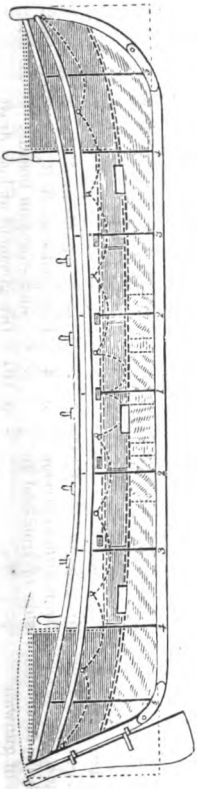

Fig. 1.—Sheer Plan.

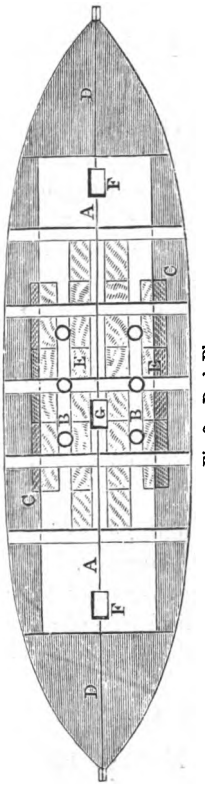

Fig. 2.—Deck Plan.

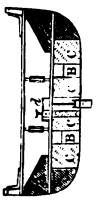

Fig. 4.—Midship Section.

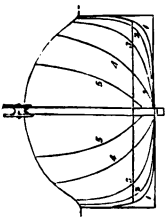

Fig. 3.—Body Plan.

plans, the general exterior form of the boat is shown, with the sheer of gunwale, length of keel, and rake of stem and stern-posts. The dotted lines of fig. 1 show the position and

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dimensions of the air-chambers within board, the relieving-tubes, and ballast. In fig. 2, A represents the deck, B the relieving tubes (six inches in diameter), C the side air-cases, D the end air-chambers, E ballast, F scuttles to admit of a free current of air under the water-tight deck, G scuttle for air and to receive pump. In fig. 3 the exterior form of transverse sections, at different distances from stem to stern, is shown. Fig. 4 represents a midship transverse section, A being sections of the side air-cases, B the relieving-tubes, of the same depth as the space between the deck and the boat's floor. C C C C are spaces beneath the deck, placed longitudinally at the midship part of the boat, with cases packed with cork, forming a portion of the ballast; *d*, scuttle for ventilation, having a pump fixed in it, by which any leakage beneath the deck can be pumped out by one of the crew whilst afloat. The festooned lines in fig. 1 represent exterior life-lines attached round the entire length of the boat, to which persons in the water may cling till they can be got into the boat; the two central lines are festooned lower than the others, to be used as stirrups, so that a person in the water, by stepping on them, may climb into the boat without assistance.

This life-boat possesses in the highest degree all the qualities which it is desirable that a life-boat should possess, viz.:—

1. Great lateral stability, or resistance to upsetting.
2. Speed against a heavy sea.
3. Facility for launching and taking the shore.
4. Immediate self-discharge of any water breaking into her.
5. The important advantage of self-righting, if upset.
6. Strength.
7. Stowage-room for a large number of passengers.

The boats of the National Life-Boat Institution, and all belonging to them, are kept in roomy and substantial boat-houses, under lock and key, in charge of paid coxswains, under the general superintendence of local honorary committees of residents in the several localities. Each boat has its appointed coxswain, at a salary of £8, and an assistant at £2 a year. The

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crew consists, in addition, of a bowman, and as many boatmen as the boat pulls oars. The members of the volunteer crews are registered, and, wherever practicable, at least double the number of men required are entered on the register. Such men are mostly resident boatmen, fishermen, or coast-guardmen. On every occasion of going afloat to save life, the coxswain and each of the crew receive alike from the funds of the institution (whether successful or not) 10*s.* if by day, and 1*l.* if by night, and 4*s.* each for every time of going afloat for exercise.

A reward of 7*s.* is given to the man who first brings intelligence of a wreck at such a distance along the coast as not to be in sight of the coast-guard station or other look-out.

A flag hoisted by day, and the firing of a carronade twice, quick, by night, are the well-known signals for calling the crew together.

On boarding wrecks, the preservation of life is the sole consideration. Should any goods or merchandise be brought into the life-boat, contrary to the coxswain's remonstrance, his first business is to throw them overboard.

The expense of a life-boat station averages £680, and is made up as follows:—

Life-boat and her equipment, including life-belts for the crew, skids, and transporting-carriage	£480
Boat-house (average cost)	200
Total . . .	£680

The average annual expense of maintaining a life-boat station is £50.

The life-boat transporting-carriage is a very important auxiliary to the boat. (See the engravings on the next page.) Every life-boat, except a few of the larger size, is provided with a carriage, on which she is kept in the boat-house, ready for immediate transportation to the most favourable position for launching to a wreck. A life-boat is thus made available for a greater extent of coast than she otherwise

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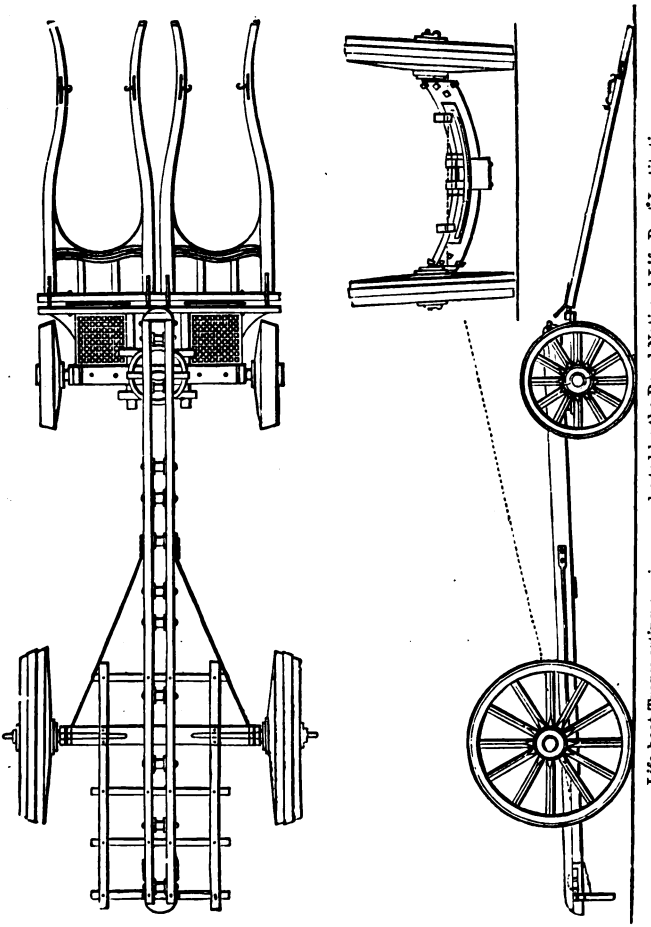
would be, and, even when launched from abreast of the boat-house, can be much quicker conveyed to the water's edge than she could be if not on a carriage. In addition to this ordinary



Life-boat Transporting-carriage, as adopted by the Royal National Life-Boat Institution.

use, a carriage is of immense service in launching a boat from the beach—to that extent, indeed, that one can be readily

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launched from a carriage through a high surf, when without one she could not be got off the beach. An explanation of the manner in which this service is performed will be readily understood.

The life-boat is drawn to the water's edge, where the carriage is turned round, so that its rear end, from which the boat is launched, shall face to seaward. The crew then take their seats in the boat, each rower in his place, with his oar over the side ready to pull, and the coxswain at the helm, or with steering oar in hand. The carriage is then backed by men or horses, or both, sufficiently far into the water to ensure the boat being afloat when she is run off the carriage; or, if the ground be very soft, or sufficient help unattainable, the carriage is first backed into the water, before the crew get into the boat. Self-detaching ropes, termed launching-ropes, previously hooked to each side of the boat's stern-post, and rove through sheaves at the rear end of the carriage, are then led up the beach, and manned either by assistants or have one or more horses attached to them.

When all is ready, the coxswain, watching a favourable moment, gives the word, and the boat, the keel of which rests on small iron rollers, is run off rapidly into the water, with her bow facing the surf. The oarsmen then give way, even before her stern has left the carriage, and she is at once under command, ere the sea has time to throw her back broadside to the shore, which is usually the effect of attempting to launch through a surf from an open beach without a carriage, unless a hauling-off warp, attached to an anchor, be permanently laid down outside the surf. This latter plan is only available in a few localities, where there is a comparatively steep beach.

The carriage consists of a fore and main body. The latter is formed of a keelway, and of side or bilge-ways attached to the keelway, and resting on the main axle, the boat's weight being entirely on the rollers of the keelway. Its leading characteristic is that, on the withdrawal of a fore-lock pin, the fore and main bodies can be detached from each other. The advantages of this arrangement are that, whilst

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the weight of the boat, when she is launched from the rear end, forms an inclined plane by elevating the keelway and fore-carriage, to replace her on the carriage she can be hauled bow foremost up the fore end, or longer incline, by disconnecting the fore-carriage, and letting the end of the keelway rest on the ground, thus forming an inclined plane, up which the boat is easily drawn. The bilgeways are needed at the rear end, that the boat may be launched in an upright position, with her crew on board; but they are not required at the fore end of the carriage.(1)

Richardson's Tubular Life-Boat.

Of all the life-boats hitherto invented, probably none are safer or more serviceable than Richardson's tubular life-boats, which have undergone, in the roughest weather, some of the severest tests that could possibly be applied to any life-boat, and in every instance proved to possess superior and extraordinary capabilities.

The invention of the tubular life-boat is by the late Henry Richardson, Esq., of Aber-Hirnant, Bala, North Wales. It dates as far back as the year 1830, when models were built, and in the year 1852 the 'Challenger' tubular life-boat was patented and constructed.

The tubular boat consists of two circular tubes, two feet six inches in diameter, and forty feet long, gradually tapering at the ends, which are bent upwards and inwards, and so meeting each other, and giving the appearance of sheer. These tubes are composed of charcoal-iron, one-sixteenth of an inch thick, strongly tinned and painted; and they each consist of twelve compartments, occupied by air-proof bags, the divisions being of the same substance as the exterior. The plates are closely riveted, other means being also taken to make them water and air-tight; and throughout, each compartment is

(1) The plates from which the preceding engravings have been taken, illustrating the life-boats of the Royal National Life-Boat Institution, were kindly lent me by my worthy friend Richard Lewis, Esq., barrister-at-law, the secretary to that most laudable Institution.

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strengthened by an iron hoop and crossbars. The tubes are placed side by side, at a distance of three feet from each other, by which the curved ends are brought nearly in contact; and they are secured by strong, but light iron arches, one for each compartment, with stays and ties. Over the arched iron is placed a grating, extending nearly the whole length of the boat; and upon this grating rests a framework, forming seats for sixteen rowers (double banked), and supporting iron row-locks, the boat being slightly outrigged with regard to the wooden frame, which rests above the centre of the tubes. It has been ascertained that the two tubes require a weight of eight and three-quarters tons to submerge them and bring the upper works to the water's edge, but even then the boat has proved perfectly manageable. There is sufficient space for stowing eighty persons in the boat, in addition to the crew, and this number would be less than the weight above mentioned. In the end compartments of each tube is fitted an air-bag, of strong water-tight material, capable of supporting fifteen persons, which greatly adds to the buoyancy of the boat. Any contrivance for enabling the boat to free itself of water is unnecessary, as none can by any possibility be retained; and the danger of upsetting is totally out of the question, because, when the boat is lifted by the sea, so as to throw one tube out of the water, the wave would immediately have free course between the tubes, and, by its own action upon the second tube, compel a righting of the boat. As no flat surface is presented to the waves, the tubes can only be broken by contact with rocks, or some hard substance; and the filling of one or two compartments from an accident of this kind would not materially impair the efficiency of the craft. Along the outside of each tube there is a substantial circular cork fender, which serves as a hold for any person in the water.

Finally, the tubular life-boat can neither be upset, swamped, nor water-logged, by any contingencies of winds or waves, in the open seas. The whole attention of the crew can therefore be directed to and fixed on the all-important object—that of approaching the wreck speedily and carefully, and saving the lives of the helpless sufferers.

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Among the tests to which the tubular boat has been submitted, were those of landing her passengers and crew, in a gale, on a lee shore, and going off again; towing, in stormy weather, behind a steamer, without any one on board, the commander of the steamer having *carte blanche* to upset, swamp, or tear her to pieces, if he could; in all of which she proved perfectly successful.

Hitherto it has been found impossible to capsize the tubular boat, because the force of the sea passes off and through the two tubes; but if she were to be upset by any cause, her buoyancy would be greater than before, and she would become a safe and manageable raft, even bottom upwards.

In addition to the tests above stated, the inventor and a small crew performed a voyage in one of the tubular boats from Liverpool to London (round the Land's End), during winter, encountering very severe weather on their passage. (1)

Some of these boats have been selected for service at life-boat stations on the coast. There is one at Rhyl, placed there in 1856 by the Royal National Life-Boat Institution, at the request of the late Colonel Morgan, of Golden Grove (then Chairman of the Committee of the Rhyl Branch), and others. And in the year 1863 the same institution placed, by request, one of the tubular life-boats at New Brighton, Cheshire. Both these boats have done noble services, and saved many lives from wrecks and vessels in distress.

The crews of the tubular life-boats have frequently expressed entire confidence in their safety and capabilities.

It would be well if all passenger vessels carried some of these boats, as they *cannot upset, sink, swamp, or be water-logged*, will not list under canvas, will beach through any surf, and are unaffected by climate.

(1) An amusing and spirited narrative of this voyage, and the singular adventures met with, are recorded in a small book, published by W. Pickering, London, entitled, 'The Cruise of the "Challenger" Life-boat.' See also an interesting account of Richardson's Tubular Life-boats, by Captain Ward, R.N., Inspector of Life-boats to the Royal National Life-Boat Institution, in his lecture on Life-boats, in 1862.

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Perfect and invaluable as the invention is, yet, strange to say, neither the late inventor of the tubular life-boat nor his son, Mr. H. T. Richardson, have ever received the slightest pecuniary advantage from the invention, although it has cost them (father and son) many thousands of pounds in advocating this noble principle.

Records of the services performed by the tubular life-boats are given in the 'Life-Boat Journal,' published under the direction of the Royal National Life-Boat Institution.

There is a beautiful model of one of the tubular life-boats in the United Service Museum, London.

Lamb and White's Life-Boats.

The life-boats under the name of 'Lamb and White's Patent,' built by Messrs. T. and J. White, of West Cowes, Isle of Wight, have now stood the test of many years' service; they are well adapted for the use of ships, steamboats, and large yachts.

These boats are extensively used by the Peninsular and Oriental Steam Navigation Company; and also by the Royal Mail West India Steam Company, all their vessels being supplied with them. They have also been adopted in vessels sent on the Arctic expeditions; and by many public companies, merchants, and shipowners.

The capabilities of Lamb and White's life-boats have been frequently and severely tested, and in every instance proved deservedly meritorious; they are built of two thicknesses of plank, with prepared waterproof material of an adhesive nature interposed. The whole of the internal work, comprising the water-tight compartments, foremost and aft bulk-heads and decks, are also in two thicknesses, with waterproof material interposed. The several compartments on each side, and forward and aft, are all built in the boat during its construction, forming double sides, and giving great stiffness and strength; which renders these boats particularly applicable for hoisting up and hanging in davits. They may be sailed in any weather, with or without ballast, and will not capsize, owing to the centre of buoyancy, when the lee

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side is immersed, being so near the gunwale; and if water is shipped, it acts as ballast, rendering them still more stable, from its being confined to the centre of the boat by the compartments on either side.

The primary object kept in view by this invention appears to have been to produce a boat which it is almost impossible to capsize; because, should such an accident occur to *any* life-boat, the crew *must* (if in a heavy sea) be in imminent peril, whether the boat rights itself or not, and whether or not the crew can swim.

If losing sight of this fact, the boat be so constructed as readily to *roll over*, and right itself again, she is liable to be rolled over and over again by the following seas with greater facility when filled with water, because the buoyancy in the bottom then becomes a lifting power. The danger of this need not be dwelt upon. On the other hand, these boats, which possess such stability (without ballast) that it is almost impossible for them to be capsized, also possess this additional important qualification, that, supposing they are ever turned over, the crew can remain *under them in perfect safety*, as has been proved by experiment. This is explained by the buoyancy of the two ends, which, in consequence of the sheer, will float the boat, so that the gunwale amidships will only be immersed three inches, thus leaving the whole interior of the boat as free of water as a diving-bell; so that the crew may remain in safety, fresh air being constantly admitted by each wave lifting the boat, as well as by valves in the bottom, which open inwards. Some of these boats are also fitted with a scuttle in the bottom, large enough to allow the crew to get through, if required. But it appears that the builders do not pretend to construct a boat which shall right itself at the sacrifice of the *main* qualification, the *secondary* one being only to be obtained by so altering the relative centres of gravity and buoyancy as to make the boats dangerous, and liable to the very accident they are intended to prevent.

The engraving on the opposite page exhibits one of Lamb and White's life-boats, of the form intended for yachts and merchant vessels.

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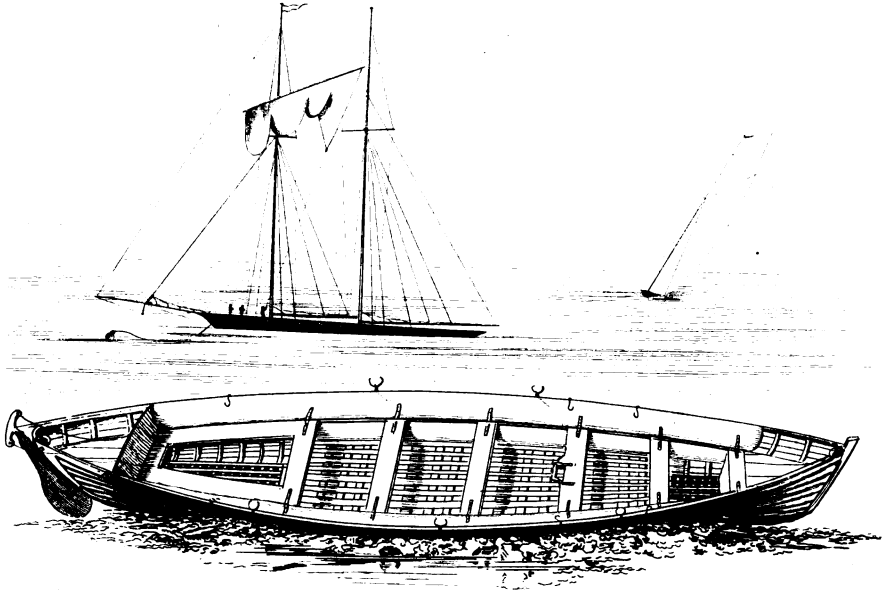

SCHOONER YACHT & LIFE BOAT.

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PART III.

MANAGEMENT OF SAILING-BOATS.

Rudiments.

'D'ye mind me, a sailor should be every inch,
All as one as a piece of the ship,
And with her brave the world, without offering to flinch,
From the moment the anchor's a-trip.'

Dibdin.

No man can be called an able seaman unless he knows how to haul down a reef-earing in a gale of wind, and lay out on a yard-arm in a tumbling sea. He should also thoroughly understand the use of the marlinspike, and be capable of making both long and short splices in a rope; should know how to turn in a dead-eye, strop a block, pass seizings, and make all the ordinary knots in a neat, workmanlike manner; and every boat-sailor ought to be equally experienced, before he is entrusted with the control and management of a sailing-boat.

A rope is composed of three or more strands; each strand consists of a number of yarns twisted together. Yarns in small ropes are sometimes called threads. Bolt-rope is the strongest, and most tightly twisted, and the best rope of all for working through blocks; it is also used for shrouds and stays; being heavier than other rope, it is the most expensive. Manilla rope is made of white flax, and is generally cheaper than hempen rope; it is clean looking, and much used in yachts and pleasure-boats, particularly for halliards; it requires to be well stretched when new, or it is very liable to kink.

Standing rigging are those ropes which are stationary, and seldom require alteration, as shrouds and stays.

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Running rigging are ropes which reeve or work through blocks and sheave-holes, as halliards, braces, &c.

A very neat way of finishing off shrouds and stays is by a simple process, called 'worming,' i.e. winding spun-yarn round the rope or stay, all along between the strands; by which means the divisions of the strands are hidden, and the rope has a smooth, neat-looking appearance.

As a complete finish to a rope where a splice has been made, it should be done over with *service*; that is, by winding spun-yarn or soft twine over the splice, with the aid of the *serving-board*. To perform such work neatly, two persons are required, one to put on the service with the serving-board, and another to pass the ball of spun-yarn or twine. Passing the ball is generally the office of the junior branches of the crew aboard ships, who by this means learn the use of the serving-board. A larger tool than a serving-board is used aboard ship for large ropes, called the serving-mallet.

Splicing a rope is joining two ends together by weaving the strands one between the other, in a workmanlike manner; it cannot be performed neatly without considerable practice.

The main-sheet.—This rope is so often mistaken for the *main-sail*, by inexperienced persons, that explanation cannot be too clearly given. The main-sheet is *not a sail*, but a *rope*, by which the main-sail is hauled in, or eased off, at the aft part of the boat or vessel; it is that *rope* which is made fast to the clew of the sail, or the outer end of the mainsail-boom, and is the most important rope in the boat, when under way. It should always be kept clear from all entanglement, so as to be ready to be let go in an instant, and release the boat from the pressure of the main-sail, in case of a squall or other danger.

Fore-sheets are ropes of similar use as applied to the fore-sail; they are attached to the aft clew of the fore-sail. It is by means of the fore-sheets that the fore-sail is eased off or close-hauled, as occasion requires. When the fore-sail works on an iron hawse, and the fore-sheets are led aft, to shift the sail from side to side, they are called bow-lines.

Sails.—A sail extended by a yard and slung from the middle is called a square-sail; a sail set upon a gaff or a stay is called a fore-and-aft sail.

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Parts of a sail.—The upper part of every sail is the head; the lower part, the foot and flap; the fore part, the luff and fore-leech; the aft part, the aft-leech; the top aft corner, the peak; the lower fore corner, the tack; the lower aft corner, the clew.

To *luff* is to bring the boat's head closer to the point from which the wind is blowing, which is done by putting the helm down, or towards the lee side.

To *jybe* or *wear* (just the reverse of to luff) is to sway the sail over from one side of the boat to the other, when running free, or before the wind. It is performed by putting the helm up, or towards the windward side. And this is the most dangerous manœuvre of all in boat-sailing, and requires caution in performance; the sudden jerk of the whole weight of sail falling heavily from one side to the other being likely to upset the boat, or carry away some part of the rigging or the mast. The most judicious manner of jybing, when under a heavy press of canvas in a stong wind, is by hauling in the main-sheet gradually; then, when the sudden jerk comes, allow the boat to feel the main-sheet and draw out the slack. It is usual, when jybing in a very strong wind, to lower the peak, and sometimes to trice up the main-tack, which are good and wise precautions. If the sail be fitted with brails, as is generally the case in open boats, it should be brailed up close to the mast, and then all may be jybed in safety.

By carrying a weather helm is implied, that in steering the boat on a straight course (close-hauled), the helm has to be kept a little towards the windward side; and on putting the helm down, the boat should instantly obey her helm, and shake the sail in the eye of the wind. If a boat refuses this in a breeze, she cannot be said to carry a weather helm, and, as a moral certainty, it is because too much head-sail is set; and until such is reduced, the boat will not be under safe command.

The *weather side* is that side of the sail against which the wind blows.

The *lee side* is the opposite side to the weather side.

The *port side* is the left-hand side of the boat or vessel, looking forward from the stern.

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The *starboard side* is the right-hand side of the boat or vessel, looking forward from the stern.

The port tack.—A boat or vessel is on the port tack when sailing with the wind blowing on the port side.

The starboard tack.—A board or vessel is on the starboard tack when sailing with the wind blowing on the starboard side.

To *port* the helm is to put it over to the port side.

To *starboard* the helm is to put it over to the starboard side.

To *tack*, to *put about*, or to *stay*, signifies turning the boat (head to wind) so that the wind blows on the other side of the sails. It is a term applied when beating to windward.

To sail close-hauled, on a wind or *by the wind.*—These are terms which signify sailing as close to the wind as possible.

Sailing large, going free, or *off the wind.*—These imply sailing with the wind on the beam or the quarter.

To *bear up*, or to *keep her away*, is to alter the boat's course by turning her head a little from the wind.

To *weather* any vessel, point, or object, is to sail to windward of it.

Wind abeam.—The wind is abeam when blowing full on one side of the boat, or at right angles with the keel.

Sailing, beating, or *working to windward*, is to proceed as closely to the wind as possible, and, by tacking from side to side, to work a passage ahead, though the wind be against you.

Lying-to or *laying-to.*—Keeping the head of the vessel to the wind, with very little sail, and so arresting progress.

Hove-to.—Keeping the vessel as nearly stationary as possible, by hauling one of the sails aweather, so that it acts against another.

To *box off* is to haul a head-sail aweather, so as to 'pay the boat's head off,' or turn her head, if, through bad steering or otherwise, she has come too near the wind.

The *buoy watches* when it may be seen floating on the surface. It *does not watch* when, by the force of the current or otherwise, it is held under water.

To *set up the rigging* is to haul it taut by means of the lanyards and dead-eyes.

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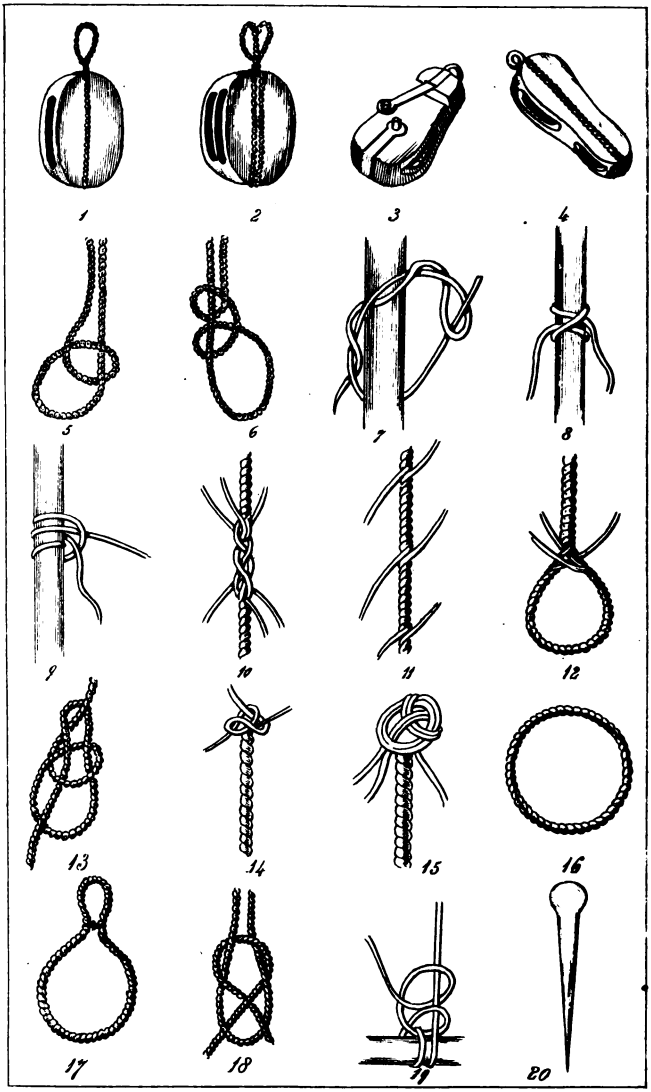

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To weigh the anchor.—To pull up, or lift it, from the ground or bottom.

Under way.—A boat or vessel is under way when moving ahead with the sails, or any one of them, set.

In reefing, tie the points without rolling the sail.

Never allow any person to stand on the thwarts, or sit on the gunwale, when the boat is under way.

It is a general rule to sling the yard of a standing lug-sail at 1–4th from the foremost yard-arm; and a dipping-lug at 1–3rd.

In small boats, the sails should be managed without any person moving from his place.

In lowering or taking in a lug or lateen-sail, let go the halliards and haul down on the fore-leech or luff of the sail.

One man should always stay by the helm until the sails are down. Accidents have frequently occurred through the helmsman leaving his place before the sails are lowered.

Boats' Blocks, Knots, Splices, &c.

(*See the Engravings on opposite page.*)

1.—A single block.
2.—A double block.
3.—A snatch block.
4.—A sister block.
5.—A single hitch.
6.—Two half-hitches.
7.—A timber hitch.
8.—A clove hitch.
9.—A rolling hitch.
10.—A short splice.
11.—A long splice.
12.—An eye splice.
13.—A bowline knot.
14.—A single-wall knot.
15.—A double-wall knot.
16.—A grommet.
17.—A snorter.
18.—A sheet bend.
19.—A fisherman's bend.
20.—A marlinspike.

Blocks, Tackles, Purchases, &c.

A boat's block is composed of three parts—the shell, the sheave, and the pin. The shell is the outer part or case containing the sheave; the sheave is the circular roller on which the rope runs; and the pin is the bolt which holds the sheave inside the shell. The best sheaves are made of brass,

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and such are the most durable; hollow brass sheaves, being so much lighter than solid ones, are to be preferred for boats. Blocks are of various denominations, according to the purpose for which required; they are very important essentials in all sailing vessels.

For sailing-boats, blocks should be no larger than consistent with strength and convenience; when too large, they look heavy and clumsy, and encumber the boat unnecessarily.

Blocks are single, double, treble, or fourfold—according to the number of sheaves.

A *running block* is one attached to the spar or other object to be raised or lowered.

A *standing block* is affixed to some permanent support.

A *snatch block* is a block with one sheave, having an iron hook at one end, and a clasp at the side to admit the bight of a rope, without the delay of reeving or unreeving the whole.

A *tail block* has a single sheave, and is strapped with an eye-splice and tail-piece, for making fast temporarily to the mast or rigging.

A *long-tackle block* has two sheaves, one above another; these are sometimes called sister-blocks.

A *fiddle block* consists of two single blocks, one above the other, but both in one shell, the upper one being the largest—the object being, for the upper rope to have play clear of the under one.

A *morticed block* is made by morticing out a block of wood or spar, and fixing a sheave in the aperture.

Double, treble, and fourfold blocks are used where extra power is required, and to ease the working of the rope: thus, a weight may be lifted by *one* man with the aid of a fourfold block, which *four* men could scarcely do with the aid of a single block. The main-sheet generally runs through one double block and one single, thereby enabling a large sail to be trimmed by one person.

A *whip-purchase* is merely a rope rove through a block with one sheave. It is the smallest purchase of all.

A *tackle* is a purchase formed of two or more blocks, with a rope rove through for hoisting.

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A *gun-tackle purchase* consists of two single blocks, with a rope rove through both, one end of which is fast to the strop of the upper block.

A *luff-tackle purchase* is formed by a rope leading through a single and a double block, the end of the rope being fast to the top of the single block, and the fall leading from the double block.

All tackles have standing and running parts, the *standing part* is so much of the rope as remains between the sheave and part secured; the *running part* so much as works between the sheaves. The *fall* is the part laid hold of in hoisting or hauling.

Dead-eye.—A circular piece of wood, with three holes in it, and a groove cut round the outer edge for the shroud to lie in. It is used for turning in the ends of shrouds and backstays; the three holes are used for reeving the lanyard through, when setting up the shroud or backstay.

A *bull's-eye* is a thick piece of wood, of circular shape, with a hole through the middle, and a groove round the outer edge.

Improved spring-thwart.—The spring-thwart is very often fitted to ships' boats, because they are as frequently required for rowing as for sailing; it may also, in some instances, be found convenient for pleasure-boats.

It is not a fixture, as the other thwarts in the boat, but may be shipped and unshipped when necessary; it rests upon the gunwale, and, being much higher than the oarsmen's thwarts, and slightly bowing or springing upwards, is a great support to the mast when stepped through or clamped to it. Ships' boats generally have a wash-strake, which allows the spring-thwart to be fitted with greater ease and convenience, by cutting away part of the strake sufficiently wide to drop the thwart down to the gunwale; then, by bevelling away the under part of the wash-strake to the thickness of the thwart, so as to admit of its sliding under the bevelling, it will remain firm. The cavity in the wash-strake should be filled up by a woodlock or shifting-piece. On the under part of the spring-thwart a strong stop-cleat should be nailed, so that the pressure caused by the mast may be on the gunwale, and not on the

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wash-board; by this plan, bolts are dispensed with, which are always in the way and out of order for such purposes.

The trunk-step.—This was invented for the purpose of avoiding the inconvenience that often exists in short open boats carrying a lofty mast. When the mast is lowered and the boat has to be rowed, it is sometimes found inconvenient for the mast to protrude over the bow or stern of the boat; and from its great length it often incommodes the sitters. For boats of this description the *trunk-step* is intended; and if the boat be fitted with a shifting spring-thwart, it will tend further to shorten the length of mast, as the trunk-step may be carried several inches higher, on account of the extra support derived from the elevated thwart. The trunk-step usually stands about two feet above the gunwale of the boat; it consists of a solid piece of wood, with a square groove or hollow, cut rather deeply into the top part, to receive the mast, and gradually diminishing in width downwards. Two strong flat iron clamps or trunk-irons are placed, one quite at the top, and the other a foot lower on the trunk-step, to hold the mast, the lower part of which should be made square, to fit close and tight into the trunk. The mast will be better supported if the heel comes low enough to catch itself in the spring-thwart. This is necessarily a heavy-looking contrivance, but better than being put to inconvenience by too long a mast, particularly when the boat is frequently in use for rowing purposes.

The *mast-clamp* is considered a superior invention to the trunk-step. It is one by which the mast may be raised and lowered in the boat by one person, and with great facility—the heel of the mast working on a pivot, and secured, when raised, by an iron pin—the whole performance being only the work of a few moments.

Trimming and Ballasting.

To trim a sailing-boat is to arrange the ballast so that the boat may sit upon the water in that position in which she may be sailed with the greatest safety and at the fastest rate.

The trim of a boat depends on the right adjustment of the

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ballast and sails. It is therefore a condition precedent to good sailing in every vessel that the exact bearings or proper water-line should be correctly ascertained, and then, under no circumstances, should there be any deviation from those bearings, nor should the vessel be put out of trim in any degree whatsoever. A boat is supposed to be in trim, as regards the sails, when, with a moderate wind, she carries her helm amidships, or with a slight inclination to windward; that is to say, will sail a straight course without any or but little steering. In order to be in safe trim, the boat should carry *a weather helm*, should come about quickly, and obey every turning of the helm, however slight. The heaviest and greatest quantity of ballast should be placed in the aft part of the boat and amidships; whilst little or none should be laid before the mast, and none in the extreme end of the stern. In sea-going boats it is important that this rule be strictly adhered to: a vessel rises to the waves so much more buoyantly when her bows are not depressed with ballast. In smooth water, a small portion of the ballast should be laid in front of the mast in some boats; and in long narrow sailing-boats this is generally necessary.

The boat should not be laden too heavily with ballast, but merely weighted down to the true bearings or proper water-line. It is a very necessary precaution that, when the boat lists over, the ballast may not slip or move. Should it fall suddenly into the lee-bilge, a capsize is almost inevitable. Strictly speaking, the ballast should all be secured beneath the platform of a sailing-boat; but in very small boats, and those launched from the beach, this cannot be done. It should, however, in every boat, be lashed or secured so that it cannot slip when the boat lurches or pitches.

The best ballast for small boats is lead, but of all kinds the most expensive; it sometimes costs more than the hull of the boat. It is, however, preferable where expense is no object, as it may be stowed away in a very small compass, giving more room for accommodation, and rendering the boat stiffer under sail than by any other kind of ballast. It creates neither rust nor dirt; and when done with, like silver and gold, it will

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always realise its intrinsic worth, in whatever shape or quantity.

Every sailing-boat must have more or less ballast, according to its size and the form of its hull. A boat without ballast is unsafe and unmanageable. In ballasting a skiff, small flat-shaped kegs of water are very convenient, as they may be stowed away under the thwarts and in the bilge of the boat, and may be filled and emptied at pleasure; that is to say, when the crew consists of only one or two persons, the kegs should be filled, but when several persons are in the boat less ballast will be required, and some of the kegs may be emptied. Again, a boat at starting may encounter fine weather and a light wind, and will require only part of her ballast; but a strong wind may come on before returning, when all the ballast will be needed. Another advantage afforded by the kegs of water ballast is, that if a cording be put round them, so as to form handles, in case of the boat being upset, an empty keg will answer every purpose of a life-buoy; and supposing each keg to be about the size of a two or three-gallon cask, it would sustain two persons above water, on their laying hold of the cords, one person on each side.

Bags made of tarred canvas, and filled with small shingle, are often used for ballast; but they are not very durable for the purpose. It is a good plan to put the shingle in wooden boxes, and place them along the floor of the boat. The boxes may be about one foot in breadth, by three or four feet in length, and six inches deep. Iron ballast will be found to take up less room than shingle, and it may be laid under the boat's floor; and if the iron be painted or tarred, and then covered with canvas, which may also be painted or oiled, the dirty rust and iron-mould will be avoided. Sand ballast is also a weighty material, and may be stowed away very conveniently, particularly if put in bags or boxes.

In ballasting all kinds of small boats, that description of ballast which takes up least room in the boat is always to be preferred.

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Hints as to Rigging Sailing Boats.

After the boat is launched and the ballast carefully adjusted, the next step is to ship and fit the mast, which should be no larger than necessary; and it had better be too small rather than too large, so as to snap off before upsetting the boat; or, in other language, a mast that the canvas will carry away rather than capsize the boat. If this were constantly attended to in fitting out open sailing-boats, accidents would be of less frequent occurrence. The sole cause of the lamentable accident, a few years ago, to the Lytham life-boat, may be attributed to the mast being too stout; so that even life-boats are not exempt from danger, when canvas is set on a disproportioned mast. When the boat is fitted with a mast of suitable size, it is a rule, in setting sail, that so much canvas only as the mast can bear is all the boat can carry. When too much sail is set, something must give way; an accident is inevitable, unless the sheet is let go, or the sail immediately reefed. If the boat be upset, loss of life is generally the result; but when a mast 'goes by the board,' all sail standing, there the damage generally ends, except, perhaps, some slight breakage of the bulwarks or gunwale.

The mast for a sailing skiff or small pleasure-boat may be rigged with one or two small ropes for shrouds, which will be a great protection to the mast; and when such are used a small-sized spar will answer the purpose better than a large one, and will be also better for the boat, and enable it to sail faster and more buoyantly, than if encumbered with a heavy mast.

It must also be remembered that a sprit-sail needs but a very small mast, smaller in proportion than that required for other main-sails. The greatest strain upon a sprit-sail's mast is just at the heel of the spreet, or quite at the lower part of the mast. The mast for a sprit-sail should be stoutest at the lower part, tapering off gradually to the top; but for a lug-sail, lateen, and others, it should carry its size well up to the sheave-hole, or halliard-block. A rope called a *spreet heel-rope* should always be used for the sprit-sail. This rope must be

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rove through a block at the mast-head, one end being furnished with a loop, which receives the heel of the spreet, under the selvagee strop or snorter, so that, on the spreet heel-rope being hauled taut, it takes part of the pressure of the spreet from the mast, and throws it forward. By this means too, the spreet will turn more readily on its heel when the boat is put about, or on jybing; the heel-rope will also be a means of preventing the constant chafe of the spreet against the mast, which cannot be avoided when the heel-rope is not used. The position of the strop or snorter which holds the spreet to the mast should never be more than one-third of the way up the fore-leech of the sail.

The length of the spreet must depend on the size of the sail. It should be no longer than necessary. The small end, or top, is that which is put into the peak-eye on setting sail, the largest end being the heel or lower part, which is set in a snorter or selvagee strop, as above stated. The best spreets are small tough spars of white or red fir, that require little or no reducing. The same observations will apply to yards for lug and lateen-sails, which should be neither larger nor heavier than absolutely requisite, for it is better to carry away a spar now and then than to upset the boat by using those which are too large and heavy. Sailing skiffs are usually fitted with a small iron bumkin, on which to hook the tack of the fore-sail. The bumkin is fitted to the stem, and secured by an iron pin, which passes through the stem and shoulder of the bumkin, and may be unshipped when not in use. Bumkins answer very well when not more than a foot or foot and a half in length. When longer, they are objectionable, on account of the weight of iron projecting over the stem. Iron bumkins are not so desirable as wooden bowsprits, because, in the event of an accident occurring by running foul with the boat, a heavy blow would wrench the stem out, rather than bend or break the bumkin; whilst a small bowsprit would give way, or snap off, and probably no further damage would occur to the boat, beyond the breakage of a small spar.

A boom is seldom used with a sprit-sail, except for short wide boats where the aft or mainsheet-tack reaches beyond

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the stern, in which case a small boom is necessary. It should be fitted to the mast with a goose-neck, so that, when the sail is brailed up, the boom may be drawn or turned up close to the mast.

The halliards, and all the ropes connected with the upper part of the mast, should be rove through small blocks; and in small boats, where two or three blocks only are required, it is a very good plan to fit the top of the mast with a galvanised iron hoop, having several small eyes on which to hook the blocks; the eyes should stand out sufficiently far to prevent the chafing of the blocks against the mast. The *iron* hoop recommended for this purpose is preferable to *copper*; there being considerable strain on the outstanding eyes, they would be liable to break off if made of copper, unless of a larger size than neatness requires. It is a bad plan to reeve halliards through a sheave-hole, especially a half-sheave, because in wet or damp weather the rope will become so stiff and hard as to be liable to get jammed; and unless the halliards run free and easy, the boat is exposed to danger, which is avoided by reeving the halliards through the blocks, as before suggested. Sheave-holes and half-sheaves are not recommended for sailing-boats.

The running-tackle or back-stays are generally dispensed with in skiffs and small sailing-boats by fitting the shrouds a little abaft the mast.

The main-sheet should be rove through two blocks, which will very materially ease the labour of working that rope; one of the blocks should be seized to the boom, the other to the mainsheet-hawse. In large boats, double, treble and fourfold blocks are sometimes used, which render the working of the main-sheet still more easy.

The lug-sail for a skiff requires no brails. The sail should be lowered in a heavy squall, and the same on bringing up in port. Whenever a sail is not furnished with brails, extra attention should be paid to the halliards, to see that they are always clear and fairly rove.

It is necessary to caution young boat-sailors against narrow boats, for sailing purposes. The narrow form of hull may be well adapted for rowing, but is at all times dangerous for

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sailing. Large fore-sails in small open boats are also attended with danger, and are more frequently the cause of accidents than the main-sail. It should always be borne in mind that the boat, to be safe under sail, must carry a 'weather-helm;' and such will not be the case if the fore-sail be too large. Short wide boats, rigged as sloops or cutters, or with sprit-sail and fore-sail, are well suited for turning to windward in narrow channels. Long boats are fastest for long reaches, sailing on a bow-line, and running before the wind.

For small or open boats, it is not considered a safe plan for the fore-sail to work on an iron hawse. The fore-hawse should only be used in decked boats, and those where a jib is set as well as a fore-sail.

Setting Sail.

On setting sail, first see that the bobstay is secure, and the bowsprit bowsed down at the outer end; then cast off the main-sail lashing, and look to the main-sheet and halliards; unfurl the fore-sail, and lay it out ready to hoist; haul out the jib on the bowsprit, and run the jib-sheets to their berths. Having got all three sails ready, hoist the main-sail before you set the head-sails; make the main-halliards fast on one side the mast, and the peak-halliards on the other; the peak should not be entirely set up until the main is well set; then hoist the fore-sail, and slip from the moorings. Having got away clear, set the fore-sail fairly, and hoist the peak of the main-sail. Whilst under way, run the jib up, and trim the sheets; then coil the halliards neatly and separately, so that they are each and all ready at an instant's notice. If the course is to windward, or on a reach, bowse down the main-tack; if before the wind, the main-tack may be cast off, and the sheet given freely.

If, on slipping from the moorings among crowded shipping, it is necessary to turn the boat quickly round, and there is but very small space in which to do it, having set the head-sails, haul them both aweather, drop the peak of the main-sail, ease off the main-sheet, and put up the helm; the boat will then turn as if on a pivot, if she be in proper trim.

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Reefing.

'One night, as we drove with two reefs in the main-sail,
And the scud came on low'ring upon a lee shore,
Jack went up aloft for to hand the top-ga'nt sail,
A spray washed him off, and we ne'er saw him more.'

Dibdin.

Reefing the sails is a performance with which every person should be thoroughly familiar who ventures to leave the shore and take the command of a sailing-boat; for it is impossible to tell how soon he may be compelled to reef the sails, in order to ensure a safe return to himself, his crew, and his boat.

Reefing should generally be done in anticipation of a strong wind or heavy sea; it should always be commenced in time, performed carefully, and with as little delay as possible, for lost moments in fair weather are difficult to regain in foul.

In a sailing match, the boat is kept on without reefing as long as she can stagger under her canvas; but on such occasions there are always plenty of hands aboard to assist in the expeditious management of the sails.

When about to reef the sails, luff the boat up close to the wind, but not so as to allow her to come about; ease off the jib-sheet, or, if you intend to set a smaller jib, take in the other the first thing; then haul the fore-sail aweather, and make it fast; haul in the main-sheet as close as possible, and the boat will be 'laid-to.' Now lower the peak, then the main, sufficiently for the intended reef; cast off the main-tack, and begin at the earings, or outer end, by hauling down the reef, and securing it with the reef-earings to the boom; then tie up the points with reef-knots, all along the sail, and make the main-tack fast. The reefing being so far completed, set up the peak, cast off the main-sheet, trim the fore-sheets, and the boat will then be under a single-reefed main-sail. Another reef may be hauled down in a similar manner, and the boat will then be under a double or two-reefed main-sail; and so of a third reef. Never tie up the points of a second or third reef until the first or lower ones have been secured; you may then

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shake out the reefs one at a time, as the wind decreases. Always look to your reef-tackle before setting sail, and see that the earings are sound and strong; for it is seldom necessary to reef except in heavy winds, which try the strength of ropes and tackle.

Furling the Sails.

This is also frequently termed 'stowing the sails;' it merely implies rolling them up neatly, and in a sailor-like manner.

The *main-sail* is furled as follows:—The sail being lowered down into the boat, place the gaff and boom close together, one on the top of the other; then lift the flap of the sail over the boom, and lay the aft-leech over the flap, hauling it taut from the gaff end; keep all taut whilst another hand rolls up the loose sail neatly, and close to the gaff. The sail should not be rolled *round* the boom, nor *round* the gaff, but *close up to* the latter. Then pass three or four small lashings round the sail and over the gaff, and, having secured them, the main-sail will be furled.

The *fore-sail* may be furled in the following manner.—When the sail is fixed to, and traverses the fore-stay up and down, by means of brass thimbles (the most usual way), it should be let down to the stem of the boat, rolled up, and an oilskin coat spread over it. In small boats, when the fore-sail is not attached to, or does not traverse the fore-stay, but the rope on the fore-leech of the sail forms the fore-stay, then the fore-tack may be unhooked and the fore-sail rolled up in the main-sail.

Jibs and gaff-topsails are generally kept in the forecastle, or in the cabin, or whichever is driest and most convenient. In small sailing-boats having neither cabin nor forecastle, they are sometimes rolled up in the main-sail.

After the main-sail is furled, a water-proof coating should be put over it, extending from the mast to the boom end; but it is not a good plan to leave the sails coated and furled for any length of time. A few days will sometimes incur the risk of mildew; therefore they should be exposed to the air as often as possible.

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The *sprit-sail* is generally furled by rolling it up close to the mast—not round it—after taking out the spreet, and without lowering the main-halliards; the fore-sail should be rolled up inside the sprit-sail. It is a neat method, but an oilskin coating cannot conveniently be fitted over a sail furled in this manner.

When the sails are wet, they should be loosely furled, unless they can be spread out to dry. New sails should be well and frequently wetted with salt-water, when the boat is under way, to preserve them from mildew. In damp or wet weather sails require much attention, and must be frequently spread and exposed to the air during the driest part of the day; if neglected for any length of time (although under an oilskin coat), they are very liable to be disfigured and otherwise injured by mildew.

Sailing to Windward.

'Thus tars at sea, like swabs at home,
By tack and tack are biass'd,
The furthest way about we roam,
To bring us home the nighest.'

Dibdin.

Sailing or beating to windward is one of the most interesting performances connected with the art of boat-sailing. The tyro should spare no pains to make himself master of it; and with that view he must thoroughly accustom himself to the use of the tiller; and practice sailing in all the varieties of light airs, gentle breezes, and strong winds. The art of sailing a boat against the wind, by sundry zig-zag performances, is one that requires considerable attention, a watchful eye, and frequent practice; for although the rudiments of the art may be learnt in a few lessons, the art itself, which is the perfection of boat-sailing, can only be acquired from long experience. The principal thing for the helmsman to attend to in sailing to windward with effect, is to watch the fore-leech of the main-sail, or that part nearest the mast. The boat should be sailed as close to the wind as possible without shaking this part of the sail, which is always the first to

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quiver to the breeze, and warn the keen-eyed sailor of too close a luff. Many sailors steer by a vane at the mast-head, and some cannot sail a vessel without one; but such is an uncertain guide, and it is a bad practice to steer by it. Some steer by the ripple on the water, which may be all very well when the wind is light, but at best an uncertain guide. The young boatman who wishes to become skilful in the art of sailing to windward will practise his eye upon the fore-leech of the main-sail, which is always the most faithful and unerring indicator; the instant the slightest waver is perceptible in this part of the sail, he should bear up a little; the least motion of the tiller will suffice, if the boat be in proper trim. It often happens that the wind is unsteady, blowing sometimes in a continued strong breeze for two or three minutes or more, and immediately afterwards a light wind follows; but this occurs chiefly with easterly winds, which are generally irregular. On such occasions great advantages may be gained by watching the effect of the wind upon the luff of the main-sail; for the boat can be sailed two points nearer the wind in some of the gusts than in others; then is the the time for the skilled helmsman to wedge his way to windward in the race, and leave his opponents in the lurch.

The greater the force of the wind, the closer the boat may be sailed to it when in smooth water; and in racing, or match sailing, an experienced helmsman will so narrowly watch the wind, that should the slightest variation occur, he will take advantage by sailing his boat up to it with all possible precision, but never so as to allow any part of the sail to quiver or hinder the boat's progress. It is a well-known maxim in sailing to windward to 'keep her full,' that is, to keep the sails full of wind, and not allow any part of them to quiver; for a shaking or quivering sail is, at the time, of but little assistance to the boat.

In beating to windward in a very narrow channel, it is best to take in the jib, and work the boat under main-sail and fore-sail; the jib is the sail that sticks the boat ashore in channels which are so narrow that a vessel is no sooner round and on fresh way than it becomes necessary to put

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her about again. On putting the helm down, to 'come about,' it should not be put over too suddenly, but gradually, that the boat may obey it quicker. Some people are so impatient in getting the boat round, that the helm is jammed over all at once, and oftentimes the boat misses stays in consequence, which not only causes delay and vexation, but danger as well. Another practice equally erroneous is, putting the helm up before the boat is fairly round, by which means she loses way, or lays head-to-wind, without going ahead; and it then becomes necessary to haul the fore-sail aweather, to pay her head off, or the main-sheet must be eased to allow her to veer off into the wind.

In sailing to windward, a good deal of discretion is required as to the proper sized jib to set. As a general rule, a boat will go to windward better with a small jib than with a large one. Many a race has been lost through carrying too large a jib when working to windward. The effect of a large jib is to sag the boat to leeward, particularly when she has but little way on her; this may be seen when the boat is put about. It is a good rule, that the jib-sheet should never be trimmed on coming about, until the boat is fairly going ahead on a fresh tack.

Gaff-topsails are seldom of any assistance to a boat when working to windward, except in very light airs, and under high cliffs; they are, however, of great service in reaching and running with a free wind.

But, withal, it is impossible to bring out the utmost speed of which a boat is capable, unless a number of preliminary points be first carefully attended to—such as ballasting, rigging, setting and shifting sails, trimming the sheets, &c. &c., each of which is almost an art of itself, and cannot possibly be learnt without considerable attention and experience; but with these combined, a good sailor, with a good boat, will frequently have the satisfaction of finding himself foremost in the race. And experience, with skill, may make many an old-fashioned vessel beat a new one.

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Reaching, and Sailing on a Bowline.

By reaching is meant sailing with a side wind. The boat is said to be on a reach when the main-sheet is not quite close-hauled; and on a bowline, when the wind is free and the sheets are eased off so that all the sails draw powerfully.

The principal points to attend to when sailing on a bowline are, to trim the main and jib-sheets to a nicety; not so that they stand too slack, or cause any part of the sail to flap or quiver, but in such a manner that every inch of sail is felt by the boat. The greatest speed at which a boat can sail is brought out when sailing on a bowline.

Long boats are fastest for this branch of sailing. A boat with a long keel and narrow form of hull, if judiciously ballasted, will pass many a sea-going boat in smooth water, with a reaching or bowline wind.

The fastest description of boats for reaching, are large sailing galleys or yawls, with one, two, or three lug-sails; and such, in smooth water, are formidable opponents to many a racing-yacht; but such narrow boats are not recommended to inexperienced hands. They are much in favour with pilots, who are obliged to hasten out to vessels, and are then generally well manned and beautifully handled; besides, they seldom go out with a smaller crew than five or six, and in large boats sometimes more than double that number.

Should a heavy squall strike the sails when reaching in a strong wind, the boat must be instantly luffed; but if the squall be very sudden, and there is not sufficient sea-room for luffing, the main-sheet should be slacked at the very instant, by which means the pressure of the sail will be eased, and the boat will quickly recover itself. In bearing-up or wearing round, when on a reach, if the wind is strong or squally, the main-peak should be lowered, and the main-sheet slacked, or there will be danger of carrying away the mast. If the boat has running tackle or back-stays, they will be a great support to the mast on such occasions.

When a boat is capsized in bearing-up or wearing, the water first comes in over the lee bow, which, in hazardous sailing, is sometimes nearly driven under water.

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Scudding, or Running before the Wind.

'A wet sheet and a flowing sea,
A wind that follows fast
And fills the white and rustling sails,
And bends the gallant mast.'

Cunningham.

This branch of the art requires to be performed with caution, particularly during a strong wind, or in squally weather; although to the inexperienced it may appear the most simple and easiest mode of sailing, and the least fraught with danger, as the boat travels more upon an even keel, and without lying over on her side, as she sometimes does in sailing to windward; but experience has shown that scudding is of all sailing the most perilous, because of the risk of the main-sail suddenly jybing. A back-stay is necessary when running before a strong wind, in order to protect the mast from being carried away. The shrouds or rigging at the sides are no protection to the mast when sailing with the wind abaft.

When running before the wind, the main-sheet should be given out freely, the running tackle cast off to leeward, and set up to windward. The sail should be allowed to blow out as much as possible, but not so as to chafe against the shrouds; the main-tack should be cast off, in order that the main-sail may hold the better wind. A watchful eye must be kept upon the sail, and attention paid to the wind; for should the sail be suddenly jybed or blown over to the other side of the boat, when the main-sheet is all run out, the boat is almost certain to be capsized, or the mast carried away, if there be much wind. But in order to avoid this, when running directly before the wind, should the sail exhibit the slightest symptoms of being taken aback, by wavering to leeward, then the helm should instantly be put down a little, so as to avoid a jybe if possible.

It may be observed that the boom swinging suddenly over from side to side is apt to knock anybody overboard who does not happen to be on the look out; the person steering should,

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therefore, always give warning when the boom is coming over.

Should a squall strike the main-sail fairly, when running before the wind, and appear too heavy for the boat, it may readily be eased by putting the helm down immediately, and bringing the boat up into the wind, and so probably saving the mast from being carried away.

The boat should be steered as straight a course as possible when scudding. The fore-sail will be of little or no use, when going directly before the wind, unless boomed out; the jib-sheets should be slacked, and the jib allowed to draw as freely as the other sails.

It is customary, when the wind is fresh and squally, to lower the peak of the main-sail, or to trice up the main-tack, either of which proceedings will be the means of taking some of the strain off the mast; but the safest precaution is to reef the main-sail and take in the jib. The danger of scudding or running before the wind is much greater in a heavy sea than in smooth water, and a boat is generally hard to steer when she pitches. The safety of the boat and crew, when scudding in a heavy sea or strong wind, depends almost entirely on the watchfulness and skill of the helmsman, who, on observing the least inclination of the sail to jybe, should instantly ease down the helm.

If the main-sail has no boom, it will be the more liable to jybe suddenly, therefore extra precaution must be used with such a sail when running before the wind.

The young sailor must always bear in mind, when a squall strikes the sail and the boat is in danger, that he must put the *helm down*, that is, push it towards the same side as the sail is; (to put the helm *up*, is to push it from the sail); and this precaution must be distinctly impressed upon his mind, unless he has a particular wish

To Capsize the Boat.

To perform which, he has nothing to do but put the boat before the wind (which is the scudding position above explained), slack out the main-sheet and make it fast to leeward, put the

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helm up, and allow the sail to jybe, and then, over goes the boat! This is the neatest mode known to the Author of capsizing a boat, and giving yourself and crew a complete turn out, and good ducking.

Boat in Stays.

A boat or vessel is 'in stays' immediately after the helm is put down to bring her about, and when the sails are all shaking in the eye of the wind; but directly the fore-sail has 'payed off' the head, and brought the boat round, she is on a fresh tack or reach—the port or starboard tack, or port or starboard reach. When a boat is in stays in squally weather, it is a critical moment, for should the wind take the sails aback, or a squall strike them, there is danger of upsetting the boat, which has then no way on, i.e. is not going through the water, therefore will not, when thrown suddenly on her side, answer to the helm. The sheets should be clear and free, lying in coils, when the boat is 'put about,' so as to be ready to let go instantly in case of peril. The jib-sheet especially should be kept slack and in hand, until the boat is fairly round and has recovered way. Long boats are always more sluggish in stays than short ones; the short beamy little craft is quickly round, generally before danger can touch her, whilst the long rakish craft takes a tremendous sweep in twisting, shooting ahead considerably in the performance, and so fore-reaching upon her shorter antagonist.

Should the boat miss stays in a squall, the main-sheet and jib-sheet must be let go or slacked, and the fore-sail drawn to windward; after which, if the squall throw the boat so flat on her side as to leave it in momentary danger, let go the halliards, if possible, in time to save the boat from capsizing.

Missing Stays.

This term implies a failure on the part of the boat to 'come about,' or to answer her helm when it is put down for the purpose of bringing the boat round, head to windward.

When a boat misses stays in a light wind, there is seldom

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any danger attending it; but when it occurs in a strong wind or squall, or in a heavy sea, there is always more or less risk, for the boat, when in stays, has no way on her, consequently she is very liable to be capsized, should a gust of wind suddenly strike the sails. It is necessary therefore, on 'coming about,' to attend to the sheets, and see that they are all clear, and not made fast until the boat is fairly on her way again.

It is a matter of prudence on the part of the helmsman of a sailing-boat to avoid, if possible, putting about in a squall, as it is also in a heavy sea, for fear of the risk incurred, and the danger attendant on a boat which misses stays. If a boat be judiciously ballasted, and in good trim, she will seldom miss stays in smooth water. But in a heavy sea there is sometimes considerable risk in 'putting about,' because the stern is alternately out of the water, and the rudder powerless when the boat is on the crest of a wave.

To Bring-up at Moorings.

'"I've heard," cried out one, "that you tars tack and tack,
And at sea what strange dangers befel you;
But I don't know what's moorings"—"What! don't you?" cries Jack—
"Man your ear-tackle then, and I'll tell you."'

Dibdin.

A vessel riding by two or more anchors in different directions is said to be moored. A boat's moorings consist of a strong mooring-chain, the two ends of which are anchored in different directions; a smaller chain, called a bridle, is secured to the mooring-chain about midway from each anchor, and a buoy is attached to the upper part of the bridle, to mark or watch the spot where the moorings lie.

Nothing looks more like mis-management than getting into a muddle with the sailing-boat when it is required to be 'brought-up' at a particular spot, or 'dropped alongside' a yacht or landing place. Bungling hands, when endeavouring to effect these performances, sometimes run foul of neighbouring boats, and in their ineffectual attempts to bring-up at moorings keep hoisting and lowering the fore-sail and peak, hauling the

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boom over, dropping anchor, jamming their fingers, working themselves up into a state of perspiration and excitement, getting their legs entangled in the ropes, and toppling head foremost in the boat, and sometimes overboard, to the amusement and ridicule of bystanders, whose hearty laughs at such lubberly seamanship increase the difficulties of the unskilful crew.

An experienced sailing-master, however, is enabled to bring-up at moorings, or drop his boat alongside another, with as much ease as a practised coachman drives along the streets, and stops the carriage at any particular door.

Bringing-up at moorings in a crowded harbour is one of the prettiest performances in the art of boat-sailing. A skilled and confident sailor comes boldly up to his berth with all sail standing, and performs the task almost to an inch, and without making a scratch upon the surface of his boat.

It should be borne in mind, that the greater the length of the boat, the more sweep it requires in coming about. A light sailing skiff requires but little room, and may easily be laid alongside, after practice; but a boat heavily ballasted, and of a larger size than an ordinary skiff, cannot always be stopped in a moment when a fresh breeze is blowing. On coming up to moorings, the distance required for the sweep must be measured with the eye, and, if in a tide-way, allowance made for strength of current. The boat should be luffed boldly alongside in a good sweep; and after a little experience, it will be an easy matter to lay her alongside with all sail standing, but, of course, shaking in the eye of the wind. It is usual, however, first to take in the jib, that the boat may have less way on her. The fore-sail should be standing until the moment before the moorings are hooked, so as to be ready to haul aweather and pay her off, in case of a failure in the performance.

Never attempt to lay a boat on or too near a lee shore in a heavy swell or a strong wind; and on going up to a berth at moorings, never do so *before* the wind, but always to windward. If it happens that there is but short turning-room, and the moorings cannot be approached in any other way

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than by running before the wind, lower all the sails except the fore-sail, and run the boat up as slowly as possible, hook the buoy with a boat-hook, and make fast quickly with the bridle.

To steer the boat when going through the water stern first, the helm must be put in the same direction as that in which the head is required to be turned. When drifting with the current in a tide-way, the aft part of the boat being deeper than the fore part, the stern will have a tendency to drive faster than the head; in which case, and in order to retain a proper control over the boat, less aft sail must be set, and more head sail.

Match Sailing.

'The mast may be bending, and threatening the gale,
The gunnel borne down deep a' lee;
But the stoutest of hearts, and most daring of men,
Win the perilous race on the sea.' (1)

Those only who have taken part in a spirited sailing match, and joined in the bold and active efforts which have led the way to victory, can truly appreciate and enjoy the pleasure and excitement of a public contest on the watery race-course, when every inch of the rippling surface is as closely contested as if life and death were pending the result.

The daring efforts that are made in strong winds and heavy seas by an undaunted crew, and their earnest struggles for victory, have often and justly been the subject of public admiration and applause.

There is no truer test of skill and daring in a sailor, and skilful seamanship in a skipper, than the fact of his sailing and winning a hard-fought sailing match in a gale of wind; and many such matches have been sailed and won by English yachters.

There must always, in a sailing match, be activity and readiness among every member of the crew; and skill and daring

(1) From a song by the Author, entitled, 'The Bonnie Boys' Race on the Sea.'

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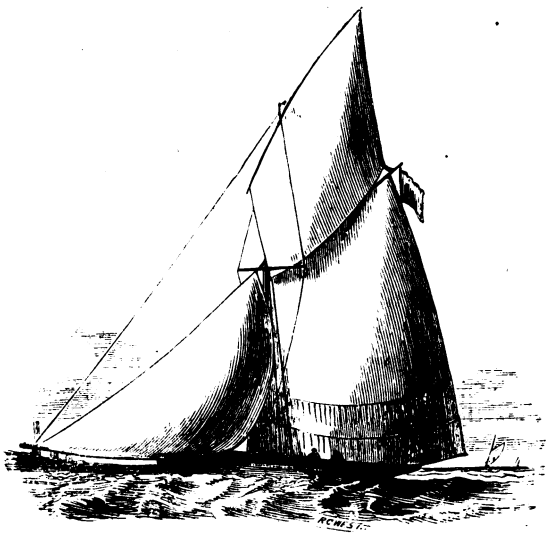

English Racing Cutter.

are indispensable at the helm, particularly when the wind is strong and the sea heavy.

Before the starting gun is fired, every man should be at his post, rope in hand, ready to perform the duty allotted to him; for, after the gun is fired, every moment's delay is a lost moment. And often the chances in a hard fought *time race*, are much in favour of the yacht that succeeds in first getting under way and taking an early lead in the race.

The boat that can be sailed fastest to windward is considered the best boat in all sailing matches, and is generally the winner of the race-cup. Although very much of the success is often attributed to the form of the hull, much more depends on the skill of the helmsman; and when it is considered how slight a touch of the helm will put a well-trimmed boat out of its course, and turn it a point or more off the wind, it is easy to understand how sailing matches may be won or lost through superior skill on the one hand, and the least in-

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attention or want of skill on the other. We can also, by the same test, account for the fact of more than one of our most famous racing cutters having been signally defeated, time after time, when in the possession of one owner, but, on changing hands, turning out a very clipper of clippers.

And besides, too, on the cut and fit of the sail the success or failure of the sailing-master's exertions in a race often depend. The sails should stand as flat as a board, and without ruck or quivering, if great and distinguished performances be expected of the boat.

The importance to be attached to the trimming and ballasting of racing boats cannot be overrated. These, however, as well as some other important considerations, are preliminary steps, to which due attention must be paid before coming to the starting point with any chance of success in a sailing match.

A few years ago, a highly disreputable system prevailed in match sailing—that of *ballast-trimming*—but which is now very properly discountenanced by all English yacht clubs. The sanction of such a pernicious and dangerous practice led to the introduction of a class of vessels unworthy the name of English yachts, and which were appropriately termed *sailing machines*. These vessels, to all appearances, when under sail, were enabled to carry a tremendous spread of canvas and to bear a great pressure of sail, although of a narrow form of hull; and they were rigged with spars wholly out of proportion to their tonnage. Strangers used to look on with wonder as to how boats of such a rakish form and rig could hold themselves up under such an amazing pressure of spars and canvas, whilst the more sturdy and stiff-looking coasting vessel of the same tonnage, found about half as much sail a sufficient quantum. A peep into the cabin, however, soon disclosed the whole secret, for there, unseen by all above deck, were three or four men trimming heavy bags of shot—real shot, such as sportsmen use to wing the feathered tribe—and those they shifted from the leeward side to the weather side—or rather from the lee-bilge to the weather-bilge, according to the tack on which the vessel was sailing—to 'hold her

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up,' or to 'keep her stiff,' as they termed it. In the absence of bags of shot, were long bars of lead or iron, which they lugged from side to side in the same manner, and then secured them from slipping by putting up slides or shifting-boards. The four men then cringed over to windward, or laid down upon the shot-bags, until they heard the order, 'bout!' when the shifting ballast was trimmed to the other side as quickly as possible, and again they coiled themselves up on the shot-bags, as before. When there was much turning to windward, ballast trimming was hard work; in fact, the hardest work aboard the yacht. As much as a ton was but an ordinary quantum of shifting-ballast for a ten-ton racing cutter, and so in proportion as to larger vessels.

Such proceedings are now strictly prohibited by the rules and sailing regulations of most, if not all, the yacht clubs in the kingdom.

Boats for racing purposes require to be very strongly built, or the immense strain caused by extra pressure of sail soon tells with effect upon some part of the hull.

When racing in small open boats, the crew should sit as low down in the boat as possible; if on the floor, so much the better.

When putting the boat about, the helm should not be put down too sharply, but slowly and steadily; by which means the boat will shoot farther ahead in turning, come about quicker, and be less likely to miss stays.

Every man should be somewhat master of the art of sailing, before he aspires to the helm in a sailing match; therefore all preliminaries as to setting sail smartly, canting round for windward berth, &c., should be first well learnt and practised. Many a race has been lost by carrying too large a jib *on* a wind, and as many more by large gaff-topsails, when, with a jibheaded-topsail and a smaller jib, the boat would have sailed faster and made less lee-way. But in reaching, running, or sailing with the wind free, the boat should be allowed all the sail she can carry; set your balloon-jibs and balloon-gafftopsails as large as the weather will allow, always acting with a judicious regard to the safety of the

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spars and vessel. I have often observed a leading boat drop astern of the others, in turning to windward under too large a gaff-topsail and balloon jib. Be the wind ever so light, those butterfly sails will not answer *on a wind*; on the contrary, they retard the progress of the boat, and deny her a fair chance.

There is a very expeditious plan, common in the Thames sailing matches, of lengthening gafftopsail-yards with great alacrity when a larger sail is suddenly needed. The plan consists in the simple mode of slipping on to the end of the yard an extra piece of spar (or yard), fitted with a shoe of copper tube. This contrivance answers admirably when the wind suddenly dies away, and a larger gaff-topsail is required as quickly as possible in order to win, or make an effort to win, the race.

In tacking to windward, in a race, great advantages may sometimes be gained by manœuvring; but nautical manœuvres can only be well learnt by practice and experience, and are scarcely a fit subject for book-teaching.

In match sailing, when there is abundance of sea-room, less skill is required, consequently less manœuvring; but in rivers and narrow channels, every move of the opponents must be watched, and every chance embraced. If two boats be standing on the same tack, and the hindmost (although perhaps the faster) cannot pass her opponent to windward, by skilfully tacking an instant or so before her opponent tacks, the next bout may, if the boat be quick in stays, reverse the order of things, and place the hindmost first. And he must be an unskilful sailing-master who, with the faster boat, cannot accomplish this manœuvre in the course of one, two, or three tacks.

When beating up against tide, the boat should be kept as much out of the current as possible, particularly when putting about; but if the tide be in favour, the boat should be kept in it, and tack where the current runs strongest.

As soon as the sails are set, the sheets trimmed, and the spare ropes of the halliards coiled and laid in their proper places, every man on board the racing boat should sit or

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squat, and so remain, without moving, until ordered to do so by the sailing-master. The crew should not sit down altogether in one part of the boat, but judiciously distribute themselves about the vessel, so as not to disturb her trim or depress her bow or stern. In small yachts and open boats this is an important consideration; the weight of one man in the wrong place may make a material difference in the trim, and consequently in the sailing of the vessel.

It is a customary rule in all sailing matches that the sails of competing vessels should not be skeeted (i. e. wetted), except when the vessel is on a wind; the sailing-master should therefore take care to skeet the sails at the proper time. In dry and sultry weather the sails become soft and expansive, and a sprinkling of salt-water not only fills up the pores of the canvas and enables it to hold a better wind, but also makes the sails stand flatter, and more drum-like, for going to windward.

When on a wind, the sailing-master who watches the wind and the luff of the main-sail closest, obtains the greatest advantage; for it often happens that there are slight variations in the wind in the course of an hour or less, and at some moments he is enabled to lay a much better course than at others. He should take advantage of all these, and wedge his way to windward; constantly creeping as close to the wind as possible, so long as he can do so without shaking the wind out of the sails. The fault in those unaccustomed to match sailing, generally lies in their too great fear of not keeping the sails full; and so, having once placed the vessel close to the wind, they are careful to steer a straight course, and, regardless of any variation in the wind, they steer as straight as an arrow for some object ahead or on shore. Now, this is undoubtedly an excellent plan when running free; but the man who so steers a racing vessel when *on a wind*, will very seldom succeed in bringing her in first at the winning goal. The man at the helm should watch constantly for variations in the wind, by keeping his eye on the luff of the main-sail; and by the most delicate touch of the helm, he will be enabled occasionally to squeeze his clipper into the very eye of the

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wind. It is only by strict attention to such opportunities, and instantly embracing them, that they can be turned to so good advantage; but, be it remembered, in a sailing match they are assuredly golden chances, when attentively and opportunely seized.

In trimming the sheets of a boat or vessel engaged in a sailing match, a good deal of discretion is required. A pull of an inch too much on the jib-sheet, when on a wind, may render the sail far less effective, and, instead of acting as a powerful drawing-sail, half its power may be lost, and it then becomes a 'lee driver.'

When sailing on a bowline, care should be taken that the sheets are trimmed so that every inch of the sails draw and assist the boat in the most effective manner.

When running before the wind, the main-sheet should be payed out freely, the jib hauled aweather, the sheet eased off, and all the sails allowed to draw powerfully, and assist the boat to their utmost. It is a mistaken notion to set up the shrouds of the mast too taut in a racing vessel; the mast should have a little play. If too confined, the vessel will appear as if benumbed, when close-hauled; whereas, by easing the weather-shrouds and giving the mast more play, the boat will be released, as it were, from its bonds, and appear as lively under sail as a bird on wing.

The Angulated Jib.

It must be obvious to those who have given the slightest attention to the making and standing of sails, that jibs, when made according to the common method, do not retain, when set, so *flat* a *surface* as fore-sails, boom-mainsails, and gaff-topsails; and it has been generally admitted, that if jibs and other trilateral sails could be made on a principle that would ensure their standing flat, many advantages would be gained.

The late Mr. Matthew Orr (of the firm Orr, Hunter, and Co., of Greenock) was the inventor of the angulated jib, which, from its construction, avoids the defect of the knuckle,

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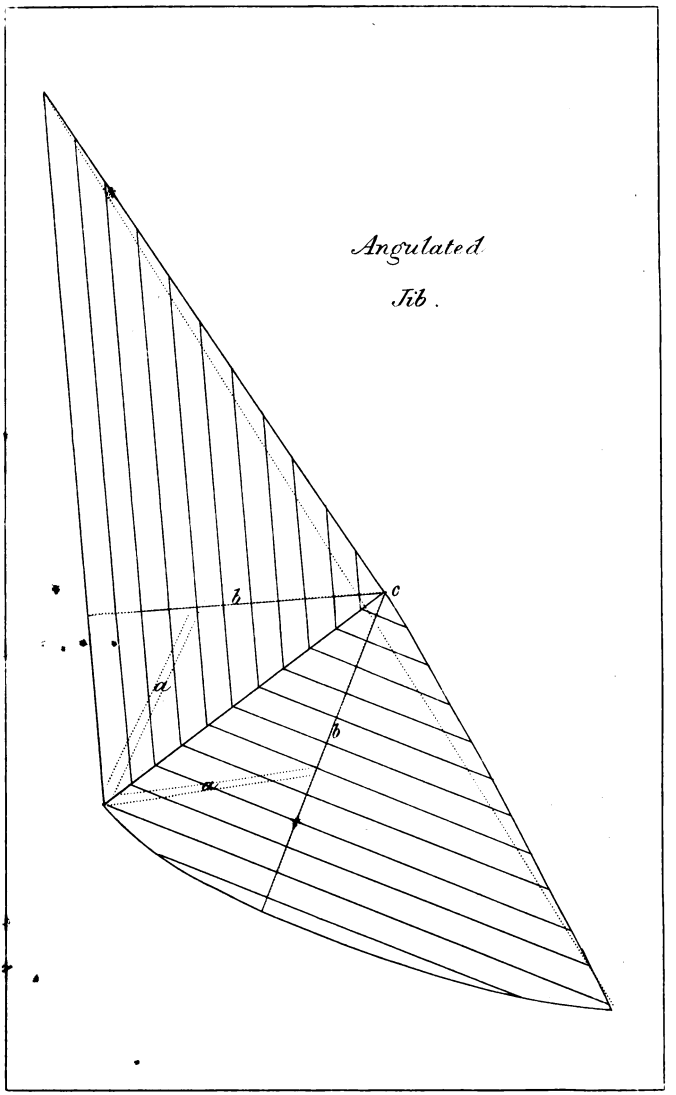

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and makes a stronger and flatter sail than any previously produced.

Every seaman is aware that the sailing qualities of a vessel materially depend on the cut or flatness of the sails, and particularly on jibs that will trim to the same angle as the other sails. In regard to boom-mainsails and fore-sails, they are made to stand flat without difficulty, and are frequently laced at the foot to booms; but a difficulty long existed in getting large jibs to stand equally flat with the other sails, particularly after much usage, by which the bagging or bulging is increased to such an extent as to render them almost useless when close-hauled. From a consideration of these facts, Mr. Orr was led to a different method of making all sails, the foot of which formed an obtuse angle with the aft-leech, and termed by him the 'angulated method,' the principle of which consists in a new arrangement or combination of the materials used, in a manner calculated to produce a more favourable effect of the power acting on them, and consequently their more advantageous impulse on the vessel; and although the plan deviates from long established custom, its utility and superiority have been confirmed by frequent tests and long experience. The principle of the angulated method is to place the cloths in such a manner as to do away with the knuckle, by binding the warp threads so that they are all acted upon by the strain from the sheet. (See engraving.) The strain bands, *a a*, are carried from the clew to meet the straight threads *b b*, running from the point *c*. Angulated sails are also made with less cloth, as they do not require so much roach on the fore-leech; and the angulated jib can be made to trim to the same angle as the other sails, as it stretches equally, presenting a flat and comparatively even surface to the wind; it also lasts much longer, and requires less trimming of the sheets, than the common jib, the strain of which is from the clew to the stay, whereby it forms a bag in the upper and lower part of the sail; and when half-worn is, in consequence, particularly difficult and troublesome to keep properly trimmed when close-hauled.

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The angulated jib has a further advantage over the common one in being less liable to shake; and when the vessel is in stays, with the sheet to windward, the angulated jib takes effect sooner than the other.

As to the Management of Sailing-boats in Squalls.

But again we pressed on her, the gale still increasing;
Not a squall now and then, but a squall without ceasing.

The Author.

On a wide expanse of water, signs of a squall may generally be seen on the surface some few moments before it reaches and strikes the sails of the boat; and at sea a squall may sometimes be seen at a distance of many miles; in which case there is plenty of time for shortening sail before its effects are felt; but in narrow rivers, and when sailing close under the land, squalls often come down upon the boat with all the suddenness imaginable: such are the most dangerous of all squalls; and it is, besides, difficult to suggest a means of avoiding their dangerous effects on an open boat; except that double caution should be taken that the main-sheet is always ready to be let go in an instant, whenever you are sailing along the coast; for squalls sometimes come sweeping down the valleys with great force, and often catch the boat in a calm, as it emerges from the shelter of some high cliff or mound; and many and sad are the accidents that have arisen from such squalls.

When sailing in an open boat, if a heavy squall is observed approaching, the peak of the main-sail should be lowered, or the sail brailed up. If only a light or little squall, allow it to just strike the sails, then luff the boat up to it, but not so as to lose all way; keep the boat going, or she will not answer the helm. If a very heavy squall, the spreet should be taken out, and the fore-sheet slacked.

It is easy to distinguish a little squall from a heavy one. The light one flits over the water like a dark cloud; but a heavy one, or 'white squall,' brings with it a fierce-looking white crest upon the tops of the waves—

'"Luff! luff!" was the shout, "a white squall to wind'ard!"
Then we eas'd her a moment, tho' her progress was hinder'd.'

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When threatened with a white squall, it is safest to let the fore-sail run down, and to drop the peak of the main-sail; and also to take in the jib, if it be a large one.

In an ordinary squall, if the sails be reefed, and the boat a safe and powerful one, there is nothing to fear under judicious management. The boat may be conducted through it with safety, by 'sailing her narrow,' i.e. so close to the wind that the fore-leeches of the sails just begin to shake; but great caution is necessary, lest the sails be taken aback.

In all cases of heavy squalls and strong winds, it is of the highest importance to keep good way on the boat; for if the boat loses way, or is stationary, the squall will tell upon it with double force and treble danger to that to which it would be liable if moving rapidly ahead.

If a squall should strike the sails whilst the boat is running free, the helm should be *put down*; and this is a very important precaution to take in such cases, for if a mistake be made, and the helm *put up*, the squall will most likely capsize the boat.

Causes of Boats Capsizing.

Notwithstanding the numerous and melancholy accidents that occur, year after year, through the mismanagement and upsetting of sailing-boats, there are persons who will not take warning therefrom, but persist in rushing headlong into dangers which, with ordinary prudence, they might certainly avoid.

The casualties that occur are not always occasioned by stress of weather, but are mainly attributable to causes within control.

Boats are not so frequently capsized on account of large sails, strong winds, and heavy seas, as they are from mismanagement or carelessness—by far the greater portion of accidents occur in fine or moderate weather. Among the principal *causes of boats capsizing* are—inattention to the main and jib-sheets; wrong adjustment of the sails, particularly the head-sails, or those before the mast; large and disproportionate spars; improper trim of hull, whereby the boat carries a lee-

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helm, instead of a weather-helm; missing stays; sluggishness on coming about; insufficient ballast; the ballast shifting and rolling over to leeward; the jambing of a rope, whereby it is checked in running through the blocks or sheaves; the sail not coming down freely; ill-fitting blocks; reckless pressure of sail; overcrowding the boat with people; intoxication; standing up in the boat; leaning over the gunwale; and various other causes, some of which are hereinafter explained.

Every person who ventures on the water in an open sailing-boat ought to know that the most important rope, and that on which the safety of the boat often depends, is the *main-sheet*; next in importance to which are the *fore-sheets*, or, if two head-sails, the *jib-sheets*. All the halliards, and indeed every rope belonging to the sails, should be laid in a separate coil, so as to be ready to be run out without obstruction, in case of sudden emergency; but more particularly the *main-sheet*, which should never be made fast, except in the slightest and most simple manner. Care should be taken that it be not entangled, or in any way hidden from view; and this whether the boat is sailing before the wind, on the wind, reaching, or otherwise. In many cases, when boats are capsized, the reason is, simply, that the person attending the sheets, in his confusion at the moment of danger—from fright, inattention, or some other unpardonable cause—fails to slack the rope until too late, and at a period when his own weight, and probably that of the other inmates of the boat, suddenly jerked over to the leeward side, actually accelerate the upsetting, and deny the boat a chance of righting.

It sometimes occurs that the coil or fall of the sheet becomes entangled or twisted about something in the boat, so as to render it impossible to be let go suddenly. Many persons may consider this as very unlikely to occur, but there are others who know it has unfortunately happened too many times to need any comment to prove its probability. E.g. suppose the fall or end of the sheet to be lying in a neat round coil at the bottom of the boat, the part leading from the clew of the sail being uppermost, and apparently all clear and ready for running out in an instant. Now the chances are, that after

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sailing a short time, this rope becomes slightly deranged, particularly if there is much of a rolling motion, or many persons in the boat, or any circumstance occurring to call the attention of the person attending the sheet to some other object; the neatly coiled main-sheet is then forgotten, becomes entangled or foul of something, and, if required to be slacked, meets with some impediment to check its course through the mainsheet-block, and thereby the boat is capsized. A rope, when drawn rapidly through a block, assumes a meandering or corkscrew form, and is very liable to catch round something or other in the boat, such as an oar, a boat-hook, a cleat, or person's foot; any slight check from either of which may cause an obstruction, and consequently a capsize. It is not unfrequently the case that a rope, although neatly coiled, becomes kinked on getting wet, particularly if new; a wet rope is also liable to swell; in either of these cases, the sheave of the block may be choked, or the rope jammed between the parts of the shell.

New rope, if not well stretched and the turns taken out before reeving through the blocks, will be liable to twist in such a manner as to stop its running freely; therefore, simple as those precautions may appear, they are very important to be observed in fitting new ropes to a sailing-boat, particularly those used for *sheets*, where a temporary obstruction may occasion the most disastrous consequences; for if the sheet be not instantaneously cleared, when the sail is struck by a squall, the boat must inevitably be capsized. Perhaps the most effectual manner of clearing away the obstruction, in such a case, would be to out with a knife and cut away the sheet; an experiment which has, ere now, saved boat and crew from destruction, even after being thrown flat on beam ends, and the water pouring over the gunwale.

Boats passing under the lee of large vessels, in squally weather, are very liable to be upset on the instant after passing the vessel. The boat having lost the wind out of her sails, has no way on; and if a squall then strikes her, there is great danger of a capsize, unless the sheets be slack and clear.

In moderate weather, or during a steady breeze, with a clear sky, and when not likely to be squally, seamen and

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boatmen are frequently inclined to take what is termed a 'slippery hitch' in the sheet: this is done by twisting the bight of the rope once round its own part. A careful sailor, however, will never, under any circumstances, allow the main-sheet to be belayed: he either holds or orders the slack to be held in the hand.

It sometimes becomes necessary, in light winds, to row and sail at the same time, either on account of a foul tide or from lack of wind; but such a proceeding is highly incautious, if the sheet has to be made fast, and no one be left in charge at the helm. The more prudent course would be either to lower the sails and depend entirely on the oars, or to dispense with the use of oars and trust to the sails. If oars are used whilst sailing, they should be employed on the windward side of the boat: there is considerable risk of upsetting the boat, through catching the oar under water, with the flat side of the blade uppermost, if the boat lays over or suddenly catches a breeze, when the oars are employed on the lee side.

Among other causes of boats capsizing, and one as likely to occur as any, is, when the ballast is merely placed upon the floor without any platform over it, or other means of keeping it secure from shifting; then, if the boat lists over in a sea-way, a slight puff may cause a more than ordinary lurch, when the ballast slips from the windward-bilge to the leeward, and no effort can then prevent the inevitable result. When running with the wind fair abaft, the sail is more liable to jybe without the boom than with it; a watchful eye should therefore be kept upon the sail, and the main-sheet must not be made fast; for should the sail jybe and the sheet be belayed to the leeward side, it will assuredly upset the boat, though only in a moderate wind. There is not a more effectual way of capsizing a boat under sail.

Boats may also be upset by having too large and heavy a mast, which gives too much leeward pressure, and materially weakens the stability of the boat. A mast should not be stiff and unyielding, but rather flexible, and not a shade stouter than necessary to sustain the pressure of the sails in a stiff breeze.

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It may be considered a singular assertion, but it is nevertheless a correct one, that many a small racing yacht of the present day, if stripped of sails, stores, and *ballast*, leaving nothing but the empty hull and spars, may be completely capsized solely by the weight of the mast swaying over on either side, although in perfectly smooth water. This experiment, however, does not prove that the spars are too large, nor does it prove any bad quality in a yacht; on the contrary, it is sometimes said that the more cranky the hull, when empty, the stiffer it will be when ballasted.

The action of the sea upon a boat running into a heavy surf may be thus described. When on the top of a heavy wave or roller, the bows are lifted high out of the water; then, as the sea recedes, the boat is hurled forward, and the bows are buried under water; when the sea, acting powerfully on her head and fore-gripe, twists her round broadside to the waves —called 'broaching-to,' and the sea then runs over the gunwale into the boat. The next motion that inevitably follows is a heavy lurch on the other side, and another sea breaks completely over and fills or capsizes the boat. This may happen either under sail or oars. There is considerable difficulty in preventing a boat from broaching-to, when stem and stern are alternately lifted out of the water by the waves; and should the boat broach-to and meet a very heavy roller broadside on, the chances are fifty to one that she will be swamped.

Drogues (1) are now a good deal used on the eastern coast, both in sailing and rowing-boats. They serve to check the boat's way, and keep her *end on* to the waves; they are, therefore, of great assistance to the crew, in preventing the boat from broaching-to. Experience teaches, that when a heavy breaker follows the boat up astern, it is useless to

(1) A drogue is a conical-shaped collapsible bag, about two feet in diameter at the mouth, and four feet six inches in length, gradually tapering to a point at the lower end. When towed by the mouth, the drogue fills with water and draws heavily, thereby checking the progress of the boat. A tripping-line is made fast to the apex or pointed end, and, by slacking the towing rope and hauling on the tripping-line, the drogue collapses, and may be drawn on board very easily.

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attempt running away from it. Then a question naturally arises, What must be done on the impulse of the moment? 'For your lives, men! back her astern; hard at it every one of you! and let the man in the stern-sheets creep forward a moment to lighten the boat's stern!' By this effort the wave strikes the boat kindly, and passes on; but if allowed to follow her up astern, so surely as such an experiment is tried, the sea will either curl over the stern, or the boat will broach-to and take it over the gunwale.

It is much to be regretted that the crews of wrecked vessels, who take to their boats in moments bordering on despair, should recklessly endeavour to gain the shore amidst the fury of the gale, driving their boat through heavy surfs, ignorant of the risk they incur; and, as a dead certainty in such a case, the boat must be swamped. Now, if they could only command sufficient presence of mind to back their boat when heavy seas threaten them astern, and keep her bows on when pulling in the teeth of the gale, they might often land in safety. It is, however, more advisable to keep out at sea during a gale, provided the boat be kept stem on, than to incur the risk of forcing her through breakers. A boat will not rise so buoyantly over surf as over an unbroken wave.

Short boats, with high sides, are not equal to long ones, with low sides, in a heavy sea. The short boat would be thrown end over end, whilst a long one, under skilful management, may be taken through the surges in safety.

Many practical and experienced sailors are ignorant of the principles or necessary acquirements for managing an open boat in a heavy sea; and when the hour of danger arrives, no wonder at their courage forsaking them, as they abandon the wreck and hasten to their certain doom in an open boat.

No class of men, either at sea or ashore in our maritime isle, or in nations far and distant, understand the management of boats in a sea-way so well as those fishermen and boatmen who pursue their daily avocations on the most exposed parts of our coast. These men learn from daily experience the safest mode of conducting a boat through the difficulties and dangers before mentioned; and they have found, and well

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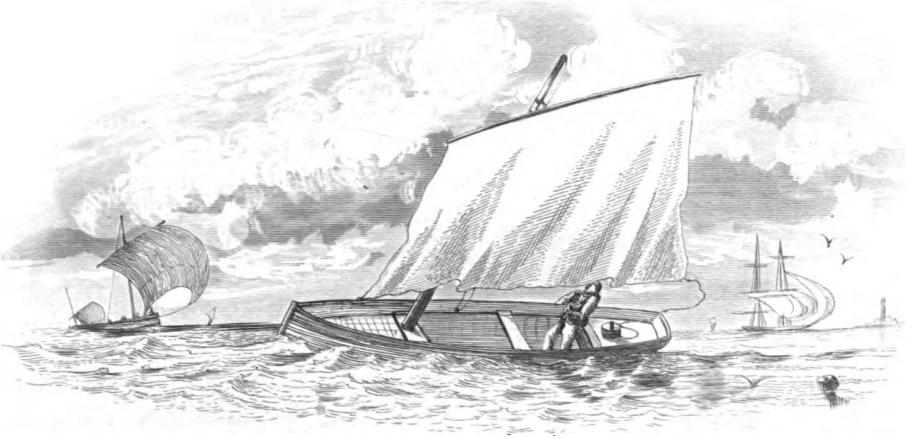

A SQUALL.

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proved, that the safest plan, when a wave threatens them astern, is, to face the danger boldly, and drive the stern of the boat at the very crest of the wave, with all the impetus the oars can give. And they are always careful in heavy seas to keep the bows and stern as buoyant as possible, not suffering any one to sit there, nor any ballast to be stowed in either of the ends.

Beadon's Improved Patent (1) Self-acting Boat-Safety-Reel.

The self-acting boat-safety-reel is the invention of Captain George Beadon, R.N., of Bathpool, near Taunton, Somersetshire. It is intended as a means of saving boats from capsizing, when suddenly struck by squalls or heavy gusts of wind. The inventor spared neither time nor expense to make the reel as perfect as possible; but it has not been much in request of late years.

The engraving represents a boat struck by a squall, the main-sheet being released by the self-acting safety-reel, thereby saving the boat from capsizing. The action of the reel appears to be simple, but infallible. There are no cogs or catches of any description; it consists of some secret contrivance contained in a small box, rather ornamental than otherwise, fixed to the thwart of the boat, and so contrived that, when the boat careens over to a certain extent, the sheet instantly releases itself, and flies off the reel. It requires no care, and cannot, without design, get injured. The reel can be instantly unshipped from the thwart, and thrown aside in the boat. It is very durable, and will last a great number of years—quite as long as a well-built boat. Its dimensions are so inconsiderable that it occupies but little space, varying according to the length and size of the sheet.

The boat-safety-reel is so constructed that it can be regulated at pleasure, so as not to permit the boat to heel over further than to any desired bearings without letting go the sheet, which instantaneously relieves the boat from the pressure of the wind acting upon the sail; so that safety does not

(1) The patent expired some long time since.

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depend on individual attention, and no movement need be made on the lee side of the boat. The apprehension of the most timid may thus be consulted.

The coil or spare end of the sheet is carried on a reel, from whence it runs off freely when required; and being protected from any obstruction, there is no possibility of its becoming foul or entangled.

The sheet, when on the reel, cannot twist or kink, and, not being so much exposed to the wet, will not be liable to choke the block by swelling.

The boat-safety-reel, being self-acting, is independent of all attendance, so that all hands may be plying the oars, when it is necessary to pull and sail together; instead of having one or two hands solely to attend main-sheet, halliards, &c.

There being an extra power combined with the safety-reel for hauling aft the sheet, the sails of the largest boats can be trimmed with ease.

As to the Management of Sailing-Boats in a Gale.

'It blew great guns, when gallant Tom,
Was taking in a sail,
And squalls came on in sight of home,
That strengthened to a gale.' DIBDIN.

In order to manage an open sailing-boat or a small yacht with safety in a gale, the sailing-master must have had considerable experience in boat-sailing. There is always more or less danger to be apprehended; and those to whom the control of the boat is entrusted should possess skill, nerve, and discretion. But with all these, and years of experience combined, it is often beyond the power of man to prevent accidents, under such trying circumstances of wind and weather.

No experienced sailor would, under ordinary circumstances, venture to set sail in a gale; but there are occasions when unexpected gales overtake sailing-boats as well as ships; and at such times it would be well to know how to manage the

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boat with the greatest chance of safety. It is always of great importance that the crew should have confidence in their boat, and also in the man at the helm. Firmness of nerve, decision, and good judgment, are highly essential qualifications in a sailing-master at such a time: many boat accidents occur through fear, indiscretion or mismanagement. The man at the helm should be bold, but wary. He will require all his skill and daring, for as his courage forsakes him the danger increases; the moment he gets unnerved he becomes more or less bewildered, and on the approach of danger, before he can do what is really necessary, perhaps the boat is capsized or the mast carried away.

When signs of an approaching gale are detected, attention should be immediately turned to the sails, which must be reefed as closely and promptly as possible, and all head-sails that can be dispensed with should be lowered and taken in; all the canvas must be inboard; and if the boat will obey her helm without a jib, it will be advisable to draw the bowsprit inboard, to save it from being carried away when the boat pitches. If the little craft will not 'wend' without a jib, a spit-fire should be set, or the very stoutest and smallest little head-sail that can be found. If the boat be a two or three-masted lugger or schooner, or if it have a mizzen, the main-sail should be lowered and entirely dispensed with, for the boat may be sailed under a fore-sail and mizzen; or, if preferred, these may both be lowered, and the boat sailed under a close-reefed main-sail, or a trysail, if furnished with one.

It is necessary to attend to the trim of the boat, under the trying circumstances of a gale, and to see that there is no ballast before the mast, in the bows of the boat, or in the extreme end of the stern. The head and stern must be kept as light and buoyant as possible. The ballast should be all judiciously spread over the floor of the boat, and a platform firmly secured upon it, so that no part of it can shift, though the boat should lurch or pitch ever so heavily.

Another very important precaution is to attend to the main-sheet, and see that it is never for a moment made fast, but

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always in a clear coil, free and ready to run out on any sudden emergency.

In a heavy sea, with a gale or strong wind, the boat should not be sailed so near the wind, nor the sails set quite so flat, as if in smooth water with a moderate wind.

Care should be taken to keep the sails full, for directly they shake, the boat loses way; and it is one of the most important principles in the art of boat-sailing (particularly in time of danger or difficulty) to keep good way on the boat; whereby she will the more readily obey her helm; whereas, on the contrary, if the boat have no way on her, the helm is powerless, and the little vessel in danger of being capsized, particularly if the sea be heavy and the wind strong.

Another precaution is necessary to be observed, particularly when scudding, or sailing with the wind abeam, in a heavy sea, i.e. *to take care that the sail does not jybe*; for, if it should, the boat will assuredly be capsized, or the mast carried away, unless the main-sheet be perfectly free, and let go at the critical juncture.

Whenever signs are observed of an approaching gale, it is always best to shorten sail in time, and prepare for the worst.

Let us now suppose a crew of three persons in a boat, overtaken by a gale, the boat having three sails set—mainsail, fore-sail, and jib—and no harbour is nearer than ten miles, and that dead to windward; there is every prospect of an increasing gale, so let the fore-sail run down, take one reef in the main-sail, run the bowsprit in and set a smaller jib, take a second reef in the main-sail, and try her to windward. The mast bends like a twig, and the little bowsprit threatens every instant to snap off; luff the boat up, and set the very smallest jib you have, but in all these movements let the man at the helm keep the main-sheet clear, and ready to ease off at any moment; he must not leave the helm an instant—let the two other hands attend the sails; haul the jib-sheet aweather, whilst a third or fourth (if there are so many) and last reef is hauled down in the main-sail. The waves are now running high, and the boat is pitching heavily; try her cautiously to windward. She flies through it madly, and must be eased or luffed a little, as the

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approaching waves meet her. Let one hand stand by (1) the main-sheet and one at the jib-sheet, whilst the other remains at the helm, cautiously watching the threatening waves. In luffing to the heaviest, the least motion of the tiller will generally suffice; be careful not to allow the boat to lose all way, or she will not answer to her helm; take advantage of every smooth sea, which usually follows three bouncing waves, to get good way on; keep her full and keep her at it, and only ease the helm on the approach of a heavy wave that is likely to drive the bows of the boat under; then luff, as it were, into the very crest of the wave, which will impede the boat's progress for a second or more; and such must be regained by bearing up instantly, but slightly, to get the sails full again, that the boat may not roll over into the trough of the seas. Be not frightened at the boat's rising and falling with the waves, so long as she answers to her helm; if she can be kept from broaching-to, there is nothing to fear—on that hangs all the danger. No one should give orders but the man at the helm, and he should bawl out so that his voice may not be lost in the wind; his orders should be instantly obeyed, as in his position he can see exactly what the boat can bear, and when she can bear it no longer. The crew should cringe down as low as possible in the bottom of the boat; every rope should lie in coils, clear and free from kinks and hangings; and every movement of the crew should, if possible, be performed without standing up.

The boat should not be sailed so near the wind as if in smooth water, but the sails must be kept full; and it will be found that the faster the boat goes, the quicker she will obey her helm. Many boats are upset by large fore-sails; therefore it is advisable to do without them in a gale, if possible, and to set a storm-jib instead; but if no jib, set a very small fore-sail. Should the sea increase so much as to render it impossible to prevent the waves from breaking over into the boat,

(1) To 'stand by' does not strictly imply that the man should be on his legs; it is far better that he should be sitting or kneeling, in a small boat. A man may 'stand by' a rope in any position—that is, be ready to haul in or let go.

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it will no longer be judicious to attempt turning to windward.

Avoid putting the boat about, unless it can be done in smooth water; the most perilous time for open boats in a heavy sea is when in stays. It will, therefore, be more prudent to bear up, and if a port can be reached with the wind abeam, it will be a safer mode of sailing than running directly before the wind. If, in scudding, it should be found that the boat has too much sail, lower the peak of the sail a little, according to your judgment. If, in running before the wind, the sea travels faster than the boat, and threatens to run over the stern, shake a reef or two out of the main-sail, and run her as fast as possible; but not so as to bury the bows under water. Get into smooth water quickly to get out of danger.

Boats and vessels are often wrecked through the rudder being unshipped or carried away by a heavy sea. All sea-going boats should, therefore, have their rudders hung and secured in the safest manner possible.

To Ride out a Gale at Sea.

This may appear like a bold undertaking in an open boat or small sailing vessel; it is, however, sometimes not only practicable, but the only means of saving the boat from being swamped, and consequently the crew from drowning. When any attempt to reach the land or force the boat ahead would be certain destruction, then is the time to consider the best mode of keeping her afloat and averting the surrounding dangers, and these may be successfully performed by lashing a few spars together, and casting them overboard, allowing the boat to ride by them from a rope at the bows, made fast to the middle part of the spars. In this manner the boat's head may be kept to the wind, and she may be prevented from broaching-to. With good sea-room, an open boat may so ride out a heavy gale of several days' duration. It is astonishing how a raft of the kind breaks the force of the sea, and so fights the battle of the waves for the boat; and this contrivance may be used whether the boat be laid-to under a small sail

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or without one. In the absence of spars, or anything wherewith to form a raft, a loosened sail attached to a yard, a drogue, (1) or an oar, will answer the same purpose; and if a sail be used, a weight may be suspended from the clew, which will impede the drift of the boat. If the water is not very deep, and you have a small anchor, with sufficient rope, the raft may be anchored, and the boat will still ride in safety. (2)

THE BEACON-LIGHT.

(*By the Author.*)

THERE'S a signal well known to the mariner brave,
His guide o'er the waters from perils to save;
'Tis hailed with a welcome wherever in sight,
And the mariner calls it 'the Beacon-light.'

A true friend in distress, ever brilliant and gay,
Whether fixed or revolving will ne'er lead astray;
Tho' many brave hearts, on a thick foggy night,
Have quaked at th' eclipse of 'the Beacon-light.'

When distant at sea and a beacon is seen,
A warning he takes of near danger, I ween;
Then he warily steers, whilst he still keeps in sight
Of his monitor dumb, 'the Beacon-light.'

When darkness fast creeps o'er the wide-ranging sea,
And the grim shark is lurking close under his lee,
Tho' gloomy the prospect and dismal the night,
His fears are dispelled by 'the Beacon-light.'

Should a gale overtake him and danger appal,
The mariner skilful may weather the squall;
But how gladly he looks thro' the darkness of night
On his guide and director, 'the Beacon-light!'

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(1) *Ante*, page 169, note (1).

(2) When the 'Flora Temple,' a first-class ship, was wrecked in the China seas, on her passage from Macao to Havannah, in October 1859, and 850 coolies were drowned; throughout the seven days whilst the gale lasted, the long-boat, with thirty-one hands aboard, including the captain, was *hove-to under a close-reefed main-sail, with a bucket veered out to twenty fathoms.* The boat was an open one, but they rode out the gale at sea in the manner stated, and their lives were saved, though they suffered severely from exposure to the wind and spray.

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The gale may increase, spreading terror around,
And 'neath the blue waves gaping sands may abound;
Still his faith rests in heaven, his hope is in sight,
'Midst the bright gleams that fall from 'the Beacon-light.'

When far out at sea on the perilous deep,
And the high-swelling waves appear lull'd into sleep;
There's the compass to steer by, and stars shining bright,
But he's sad at the loss of 'the Beacon-light.'

Long parted from friends and dear ones at home;
Long time he's been toss'd on the white surgy foam;
Then how cheer'd is his heart when welcom'd at night
With a happy return by 'the Beacon-light!'

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PART IV.

SAILING CHARIOTS, ETC.

'But who is this, what thing of sea or land?
Female of sex it seems,
That so bedeckt, ornate, and gay,
Comes this way, sailing
Like a stately ship
Of Tarsus, bound for th' Isles
Of Javan or Gadier,
With all her bravery on, and tackle trim,
Sails filled and streamers waving,
Courted by all the winds that hold them play.'

MILTON.

IT appears, from many authorities, that sailing chariots are a very early invention, though there is but little trace of their having been much used in this country; and for reasons which it is not difficult to imagine, for nothing can be more certain to frighten horses, and thereby to cause accidents to passengers on the road, than a sailing chariot.

Sailing chariots have long been known and used in Holland. In 'A Description of Holland,' published in 1743, are contained a few remarks on one belonging to the Prince Maurice, which he kept at Scheveling, a village in the neighbourhood of the Hague. This chariot is said to have been made by Stephinus, a great mathematician. The form of it is stated to be plain and simple, but resembling a boat moved upon four wheels of an equal size, and steered by a rudder placed between the two hind wheels. It had two sails. The mode of stopping the chariot was either by luffing or lowering the sails.

It is also stated that in the space of two hours it would pass from Scheveling to Putten, a distance of forty-two miles.

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Walchius (1) also speaks of the Scheveling sailing-chariot, and affirms it to be of such prodigious swiftness in its motion, and yet of so great a capacity as to its burthen, that it far exceeded in swiftness any ship under sail, with ever so fair a wind; that in the space of a few hours it would convey six or ten persons twenty or thirty German miles, and that with little labour to him who sits at the helm, who may easily guide the course of it as he pleases.

Milton, in his 'Paradise Lost,' thus speaks of sailing chariots being employed on the barren plains of China:—

> 'But in his way lights on the barren plains
> Of Sericana, where Chineses drive
> With sails and wind their canie waggons light.'

Bishop Wilkins (2) gives a chapter on sailing chariots, in which he says they are commonly used on the Champion plains of China. He also speaks of the Scheveling chariot.

Sailing chariots are also mentioned by Grotius in several of his epigrams. (3) And Hondius, in one of his large maps of Asia, gives a conjectural description of such as are used in China.

Bishop Wilkins gives two illustrations of sailing-chariots, one of which, containing seven persons, is a cumbersome boat-like contrivance, placed upon four wheels, all of the same size; it is fitted with two masts and square-sails, the larger one being placed aft and the smaller one in front. This chariot appears to be provided with a rudder, which terminates at the lower end in a point or spike, and which, it is presumed, can be raised or lowered at pleasure.

Wilkins's second illustration is a suggestive one, which he thought might be more conveniently framed with moveable or revolving sails, shaped after the manner of a volute propeller, so as to impel the chariot with a force proportionably equivalent to that of a windmill. The fore-wheels in this are much smaller than the hind ones. But the revolving sails are so contrived as to catch the wind from any quarter, and

(1) Fabularum Decas. Fab. 9.
(2) 'Mathematical Magic,' by Bishop Wilkins, 1680. Book ii. cap ii.
(3) Gro. Eps. v. xix. xx. and xxi.

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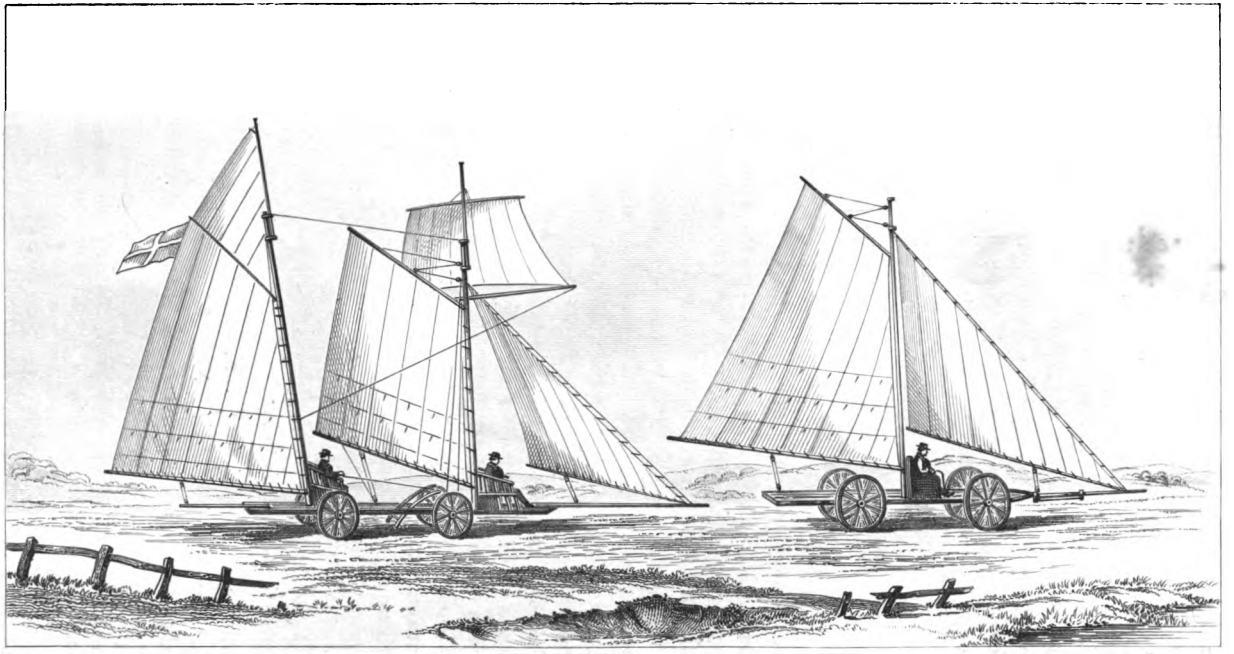

LAND-SAILING BOATS.

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set the volute in motion, and, consequently, the wheels of the carriage. Now it appears that, if these volute sails could be used in a similar manner and with similar effect to the wheel of a screw-steamer, a good deal of propelling power might be got out of them; and, with sails so contrived, the chariot might be made to go against the wind, as well as with a side or back wind, and the occupant or driver, by a very simple machinery, could at any moment stop the chariot by stopping or reversing the volute.

SAILING BARROWS.

It is stated in the Journal of Van Braam Houckgeest, in his 'Embassy to China,' that sailing barrows are used in China, but the sailing apparatus is merely an additional contrivance to relieve the toils of the barrow-men when the wind is fair. These sailing barrows are described as having a little mast, very neatly inserted in a hole or step, cut in the fore-part of the barrow. To this mast is attached a sail, made of matting, or more commonly of canvas, five or six feet high, and three or four wide, with reef-tackle, yards, and braces, like those of the Chinese river-boats. The braces lead to the shafts of the barrow, and by means of them the conductor trims his sail.

Van Braam says he could not help admiring the contrivance, and felt real pleasure in seeing a score of them rolling along one after another. (1)

THE SHULDHAM LAND-SAILING-BOAT.

This is a modern invention by the late Captain Molyneux Shuldham, of the Royal Navy, the author of many useful and valuable nautical contrivances. It is one which afforded con-

(1) 'Je ne pouvais m'empêcher d'admirer cette combinaison, et je goûtais un plaisir réel en voyant une vingtaine de ces brouettes voilières cinglant l'une à la suite de l'autre' (tome i. p. 150).

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siderable amusement to himself and friends, when prisoners of war at Verdun, they having been desired by General Wirion (the commandant of the English prisoners) to discontinue the use of their sailing and rowing-boats on the river Meuse, because of a complaint and petition of the fishermen that 'the boats frightened all the fish away!' But Mr. Shuldham, determined not to be deprived of the pleasures of a sail, invented a land-sailing-boat. The first was with one mast, the other a schooner—both being represented in the engraving which faces page 181, which is made from drawings kindly furnished by Mr. Shuldham for the express purpose of this work. The description, which he also supplied for the same purpose, is given as nearly as possible in his own words.

There is no doubt that wind power can be used with advantage in various ways, and on many occasions; and land-sailing-boats may afford a good deal of sport and amusement on plains, commons, and hard sands by the sea side, and elsewhere.

DIMENSIONS OF THE SCHOONER-RIGGED LAND-BOAT.

Length endwise, between the axletrees	5 ft.	1½ in.
Height of the wheels	2 „	4 „
Extreme distance from the lower part of one wheel to that of the other, across	5 „	1½ „
To the upper part of ditto (1)	4 „	3 „
Extreme breadth of the frame	2 „	1½ „
Length of the axletrees	3 „	9½ „
Length of the spreaders for the rigging	5 „	4 „
Length of each mast to the hounds	13 „	0 „
Mast-head	1 „	8½
Distance between the masts	7 „	4 „
Length of the fore-topmast	9 „	0½ „
Topgallant-mast	2 „	9 „
Topsail-yard	6 „	0 „

Weight of the boat, including masts, sails, &c., 500 lbs.

The general speed of this boat, on a rather rough high road, was seven or eight miles per hour; but with a fresh breeze

(1) The wheels were dished inwards.

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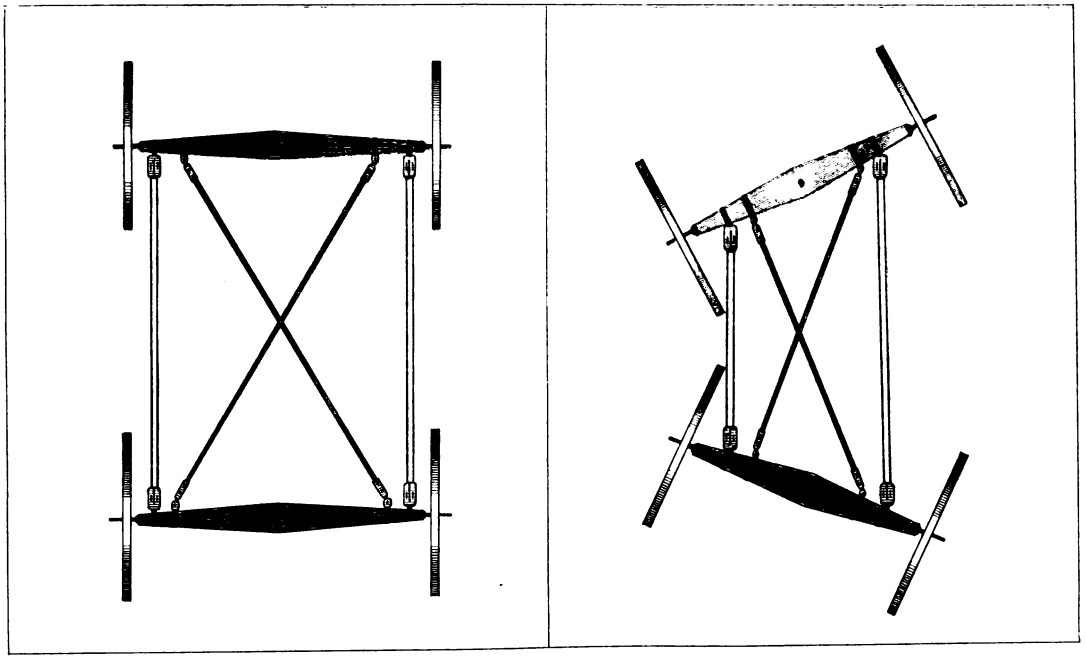

LAND-BOAT STEERING APPARATUS

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it would keep pace with, and sometimes beat, a horse at full gallop. A boat double the size would sail much faster, but the inventor adapted the breadth of beam to the ruts of the high-roads, so as to be steered and handled easily by one person alone at the helm. The boat was stopped, when required, by an anchor formed of two handspikes framed together, so as to revolve on a bolt fixed amidships in the boat, a weight being affixed to the upper ends sufficient to balance and keep their lower ends clear of the ground. To the upper ends was affixed a small tackle, which was hooked on to the right arm of the steersman's seat, so that, when he wished to anchor, he had only to pull upon the tackle-fall with his right hand, whilst steering with the left; the double handspikes would then scrape on the ground, and eventually stop the boat, without the necessity of shortening sail.

The greatest peculiarity, and indeed one of the most important features in Captain Shuldham's land-sailing-boat, is the steering apparatus, which is partially explained in the illustration opposite. Two double-pulley blocks were fixed to each of the axles, forming two tackles. Suppose the starboard tackle to be the first rove, and the fall led through a single-pulley fixed to the frame of the boat, and led upwards through another pulley fixed across the end of the fore-arm of the steersman's seat, then led athwart and downwards on the port side; then reeve the other tackle; hook the blocks to their respective axletrees, haul the fall moderately tight, and make it fast. As the fall passes conveniently in front of the helmsman, he can, by clasping it with both hands, and moving them *to and fro* sideways, steer with the greatest ease. The mechanical purchase of the tackle is eight-fold; whilst the overhauling friction of the blocks is so great that the concussions of the wheels, on passing over stones or rough roads, are scarcely felt in steering.

In turning quickly, as in tacking or veering, the fall of the tackles must be worked hand-over-hand.

The diagonal braces of the steering apparatus were absolutely needed, for without them the axletrees could not be

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brought parallel to each other when the boat was required to be steered straight. The diagonals were of ash, and sufficiently elastic to accommodate themselves to the shorter distance which the axletrees were from each other when at right angles, to what they were when parallel.

The inventor's plan of the steering apparatus seems to have fully answered his expectations; all the wheels being rudders, the boat was very lively, and could be turned so quickly that the inventor used to tack her so as to fill the sails, and a slight push ahead would then set her off again.

When the boat was sailed on a fair road, she made good way about five points from the wind; and, with sufficient space, was worked to windward with ease.

The inventor specially remarks upon the advantages of the wheels being *dished inwards*, as the stability of the boat is not only much increased thereby, but also the strength of the wheels, in consequence of much of the strain being lateral upon the lee wheels, when the boat is sailing upon a wind or with the wind abeam. To please critics, the inventor once tried the experiment of placing them upright, to the detriment of the boat's sailing, and was soon glad to replace them in their original *dishing* position.

With reference to the application of the steering apparatus to other vehicles, it may be as well to remark that the late Admiral Sir Sidney Smith took out a French patent for it, which, however, he applied to what he termed a 'Balance Carriage,' mounted upon six wheels, the diagonals being applied to the fore and the aft axletrees; but such an arrangement could not answer, because the carriage would turn just twice as quickly as the shaft horse or the pole horses. It appears that Captain Shuldham was so fully aware of this, that whenever he had to be towed in his land-sailing-boat, he only required a tow-rope, independently of the boat's being directed, excepting by steerage.

The great objection to using a land-sailing-boat on the high road is, the undeniable fact of its frightening every horse that comes near it. It appears that the inventor, in spite of all his precautions, was the cause of several accidents. On one

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occasion he upset a farmer's wife into a ditch; and this provoked the neighbouring farmers to declare war against the boat, which they did by pelting it with stones, and so riddling all the sails. On another occasion, when forcing the boat up one of the steepest hills on the road to Paris, the horse of a French cavalry officer was so much frightened that it reared bolt upright, and threw its rider.

Once, when sailing the boat on the top of Mount St. Michael, the inventor was caught in a heavy squall, which upset the boat; but it seems to have turned over very easily, without injury to the occupant or damage to the boat, and, although quite alone, he managed to right the boat; but in descending the mount at railway pace, he ran down a cow; the bowsprit touched the cow's buttocks, when she, fortunately, jumped clear of the road, or much mischief might have ensued.

The inventor, on one occasion, carried as many as thirteen persons on his schooner-rigged land-sailing-boat.

ICE-BOATS.

THOUGH seldom seen or employed in England, ice-boats are a good deal used in Canada, when the smaller lakes are frozen over. When ingeniously constructed, they sail at a flying pace, and on smooth ice the slightest wind suffices to move them along. (1)

Canadian ice-boats consist of a long, narrow, light boat, placed upon a cradle, with three large skates attached to the bottom, one on the fore part and the other two aft; and forming, as it were, an acute-angled triangle. The boat is provided with an iron rudder, or sharp blade, which can be dug deeply into the ice. They are generally fitted with sails, after the sloop or cutter rig, but other fore-and-aft boat sails are sometimes used. They can be put about with ease, sailed at great speed, and may be kept very close to the wind.

(1) There is an excellent model of a Canadian ice-boat in the Naval Model-room at the Kensington Museum.

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Ice-boats are also common in Holland, where they are found very useful in winter, in conveying goods and passengers many miles along the dykes and lowlands of that country. These boats are placed in a transverse position upon a two and a half or three-inch deal board; at the extremity of each end are fixed irons, which turn up in the form of skates. Upon this plank the boat rests, and the projecting ends serve as outriggers, to prevent oversetting. Ropes are fastened at the ends of the plank, and leading to the head of the mast, in the nature of shrouds; others are passed through a block across the bowsprit. The rudder somewhat resembles a hatchet with the edge downwards, which, being pressed down, cuts the ice, and serves all the purposes of a rudder in the water, and thereby enabling the helmsman to steer. (1)

Wilkins (2) also mentions that in Holland small ice-boats are used, having sledges instead of wheels, and being driven with a sail. But the bodies he describes as being like little boats, so that, if the ice should break, they might still hold the occupant safely upon the water.

Ice-boats are also employed on the Gulf of Finland. These boats are composed of a wooden framework, resting on three short iron runners or skates, one at each side and one at the stern. Of these, the two forward side-skates are fixtures, while the hinder one is moveable, and by it the vessel is steered. It is cutter-rigged, obeys the rudder readily, tacks and goes about in its own length, and sails as close to the wind as a yacht. The length of the Sokol (Falcon) of the Neva is about twenty-five feet, and at her widest part, where the mast rises, she is twelve feet broad. Between the outside beams and the backbone is stretched tight a network of strong cordage, which forms the deck. Such boats can, of course, be employed only when the ice is moderately smooth, or, a still more requisite condition, free from snow. In the depth of winter, therefore, they are seldom or never used; but in the month of November and the commencement of December, if the first frosts come unattended with snow, many a pleasant run is made to Strelna,

(1) Encyclo. Brit.
(2) 'Mathematical Magic,' by Bishop Wilkins.

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Peterhoff, and other villages in the vicinity of Cronstadt. Before a stiff breeze, the Sokol has been known to make thirty miles an hour. As these expeditions are undertaken chiefly in the early winter, before the gulf is well frozen, it often happens that the voyager comes suddenly upon open patches of blue water, whose deadly ambuscade lies hidden till he is close upon them, and then the only hope of safety lies in the quick eye of the look-out, the dextrous arm of the steersman, and the ready answering to the helm. Another danger lurks in the cracks and crevasses, the edges of which are forced upwards, and thus conceal the gaping fissure till the boat is close upon its brink. These obstacles stop, and not seldom upset, the ship in her swift career, and the shock is, of course, fruitful in bruises and broken limbs. Again, there is a third inconvenience. When the wind springs up very suddenly and strongly, or when the helmsman makes a sharp and unexpected double to avoid a yawning split or a plunge into open water, the novice or the unwary may be whisked off his uncertain position, and then, even if he escape with no bones fractured, will often have a long, weary, slippery trudge to regain his treacherous bark and jeering comrades. Occasionally a sudden thaw is followed by a sharp frost without snow, and this affords a delicious terrain for the ice-boat; but such a combination is exceptional in mid-winter, though it takes place not unfrequently in March, just before the final break-up of the ice. The crew consists usually of from eight to ten men; but on board the Sokol as many as fourteen have made a cruise in company. To face the biting cold, as they rush at the rate of thirty miles an hour through the thin keen atmosphere of a Russian winter, fur caps with ear-flaps, thick leather gloves, bucket boots, and sheepskin coats are indispensable. It is hardly necessary to add, that these craft transport no luggage nor merchandise, and, indeed, serve no mercantile or trading purpose. (1)

(1) See the *Illustrated London News* of April 8, 1865.

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The Shuldham Ice-Boat.

This boat, the invention of the late Captain Molyneux Shuldham, is constructed in the simplest manner possible, a mere framework of wood, to which skates are affixed; and with only one seat, like an arm-chair, which is made very strong, and permits a long ash spreader to be bolted to it at the back; at the extremities of the spreader, notches are made to receive two strong shrouds, which are secured to the body of the boat. In the centre line of the frame two cutting-skates are affixed, the foremost one serving for a rudder, and both being allowed to penetrate the ice just enough to prevent the boat making any lee-way. The rudder has a handle, and the helmsman steers the boat after the manner of a Bath invalid-chair, or a velocipede.

It will be seen by the engraving on the opposite page, (1) that the seat for the helmsman is placed just before the mast, which latter is supported by it. The boat is rigged with two sails only (main-sail and jib), an arrangement which admits the carrying of very low canvas, as the main-sail almost sweeps the surface of the ice. The sails are laced to booms, the jib-boom being shortened just sufficiently to clear the helmsman's knees. In turning to windward, the sails work themselves, which is very necessary, from the quickness with which the boat performs all her evolutions.

In consequence of the weight of the boat being so light, the inventor made her answer with common skates, which saved the trouble and expense of getting others made for the purpose. He placed them on three parallel lines. The after skate and the rudder one were fixed on the midship line or rail, and those were the only two that were allowed to cut into the ice, in order to prevent lee-way, and were ground as sharp as hatchets. All the others (four in number) were curved, so as to offer the least possible resistance. Two of them were fixed to the midship rail, and two to each of the side rails, which formed the breadth of the boat—only the midship ones were a little

(1) This engraving was also made from a drawing by the late Captain Shuldham.

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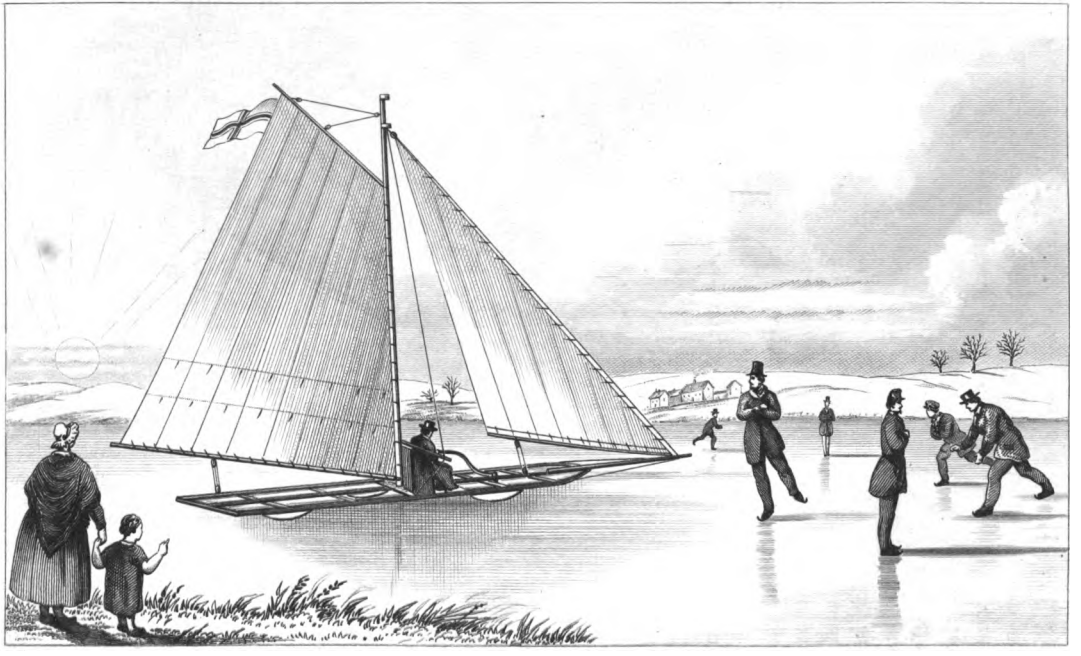

ICE BOAT

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deeper, just sufficient to raise the weather skates clear of the ice, and also to prevent the cutting-skates from penetrating too deeply into it, merely enough to prevent lee-way. Thus the boat was moved upon four curved skates and two cutting ones. The inventor found this arrangement answered admirably. The chief resistance to the propelling power was in the longitudinal line, amidships, as it ought to be.

The manner in which the ice-boat was stopped under full sail, and brought to anchor, was very simple. The performance was effected by merely turning a conical-pointed screw amidships, the handle of which was placed within reach, so that it could be turned with the right hand whilst steering with the left. The point scraped the ice when screwed downwards, and cleared it when turned upwards, thus giving the power to stop the boat as gradually as possible, and eventually to anchor without the necessity of shortening sail.

The arrangement of this boat would answer for others on a larger scale, by employing longer skates in proportion to the greater weight of the boat; but as the climate of England is unsuited to ice-boats in general, they could only be used for amusement, and it would be convenient to construct them as lightly as possible, and only large enough to contain one or two persons.

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PART V.

FOREIGN BOATS.

CANOES.

The term 'canoe' is generally understood to imply a boat constructed out of the solid trunk of a tree, by hollowing it out; and such was a means employed, not only by the ancient Britons, but also by the natives of various distant countries; and it still is, in some remote islands, the favourite, if not the only mode of boat-building that is known to the inhabitants.

In most books of voyages and travels, canoes are mentioned. Various nations have different methods of constructing them. Even the wild savages form boats out of solid timber, with no other tools than sharp stones and shells, which they select from the shingle on the coast. With some of the native islanders, the process is first to make a fire round the bottom part of a growing tree suitable for the purpose, and thereby burn it down. The trunk is then stripped of its branches, and hollowed out with the flints and shells before mentioned, fires being also made inside the trunk, when fallen, to facilitate the process of burning it hollow. With others, the tardy operation of hollowing is accelerated by burning resinous gums on the part they wish to clear away. Some islanders, having iron at hand and larger tools than others, proceed as follows:—They cut down a large, long tree, and square the uppermost side; then, turning it upon the flat side, they shape the bottom, the outside, the head, and stern. Three holes are then bored in the bottom—one in the middle, and one at each end—down to the thickness they wish to leave it; for without some such guaging they would cut away the inside, and leave the bottom thinner than intended. The tree is turned, after the guaging-holes are bored; and being propped or fixed with the

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flat side uppermost, the tedious process of hollowing is commenced. It is usual, in a middle-sized canoe, to leave the bottom three inches thick, and the sides two inches at the lower part and one and a half at the top. The ends are afterwards sharpened and finished off to a point. With some islanders, after the tree is hollowed out, the sides are raised with additional planks, which are actually stitched and sewed to the other part of the canoe with tough thongs and fibrous material, a primitive but secure mode of fastening them.

Considerable time and labour is often expended in carving figures on the stem and stern of canoes, which in some countries are ornamented with ivory, shells, and other curiosities.

The canoes belonging to Hudson Straits and Greenland are flat-bottomed and flat-sided, and do not represent much of a sea-going quality; still it is surprising the sea they go through when under the skilful management of the natives. The sails of these are made of skins and intestines of the walrus.

The canoes of the South Sea Islanders are larger, stronger, and better constructed than those of other islanders.

The canoes of West Africa are made from a large tree, hollowed out to a great width amidships, but gradually tapering at each end to narrow elevated points.

North American canoes are built of bark, in a similar manner to those of Terra del Fuego.

The Caribbee canoe is merely the trunk of a tree hollowed out by burning.

A small-sized canoe is used on the coast of Labrador, capable of accommodating one person only, being entirely covered in fore and aft, leaving a round open space sufficient to admit the body of its occupant on a seat placed in the centre. The length of these canoes, which are flat-bottomed, is from sixteen to twenty feet—the depth about fourteen inches; the breadth at the middle part (where it forms two angles) is about two feet. From these angles it gradually inclines to a point at each end. These canoes are composed of a very light framework, covered with walrus skins, and may be swept along with the double paddle very fast; and they are so light that they may be carried on the head by one person many miles. A

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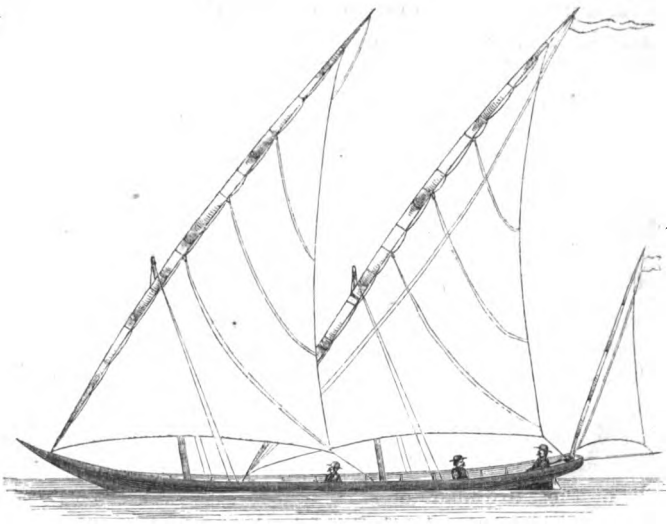

Portuguese Pleasure-Boat.

similar description of canoe is also found in other parts of North America.

Models of many of these canoes are deposited in the United Service Museum, at Whitehall; and will well repay inspection by those interested in such curiosities.

There are also many other kinds of canoes, some of which will form the subject of a more lengthened description in the subsequent pages of this work.

PORTUGUESE PLEASURE-BOATS.

The Portuguese pleasure-boats, or cahiques, employed at Lisbon and other places on the coast of Portugal, are fine, fast-sailing boats. They are rigged with two lateen sails and a mizzen, the latter being set in a similar manner to a Bermudian sail, the yard serving the purpose of mizzen-mast. Sometimes a jib is used besides; but either with or without the jib, the rig is an exceedingly light and graceful one, and well

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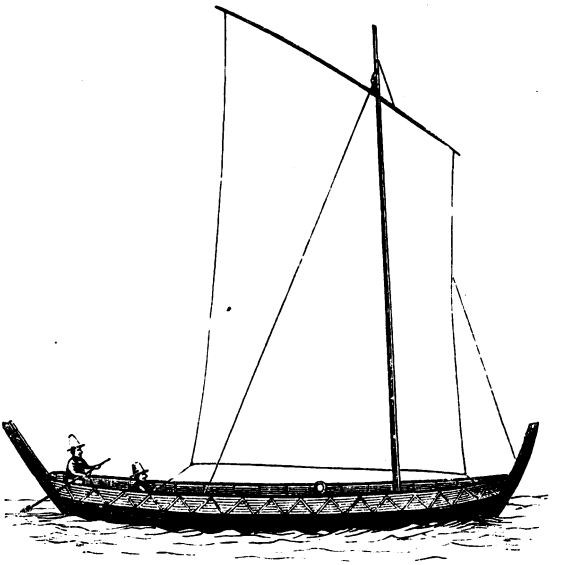

Boat of the Island of Madeira.

adapted to boats of a long or shallow form of hull. The sails are set on bamboo yards, which, though looking large, are very light and stiff. Each yard is generally composed of several pieces of bamboo at the ends, so as to give them a pointed and graceful appearance. These boats are high both at bows and stern, but low amidships. Under skilful management, they may be safely handled even in strong winds; but on such occasions one or more of the sails is dispensed with.

BOATS OF THE ISLAND OF MADEIRA.

THESE boats are of a very antiquated form, as will be seen from the engraving above. They have large elevated stem and stern-posts, of great strength, and are, upon the whole, somewhat rudely constructed; but they are wide and roomy inside, and capable of carrying a good-sized sail and a heavy cargo.

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THE CATRIA.

THE Catria is a fine open sea-boat, employed by the fishermen and pilots of the Douro. These boats are thirty feet long, by about six feet in breadth amidships, and three feet deep; they have also considerable sheer. When under oars, they are pulled by twelve or more, the rowers sitting double-banked. Being often exposed to heavy seas and broken water, they are provided with a large rudder, extending deeply below the bottom of the boat.

The catria is rigged with a large lateen, or rather settee-sail, the tack of which is hooked to the inside of the bows of the boat, and the clew sheeted astern.

These boats are managed by the native boatmen with skill and dexterity, particularly when crossing broken water, or going over a bar, under oars.

BOATS OF THE MEDITERRANEAN.

THE FELUCCA.

THE Felucca is a well-known boat or vessel employed on the Mediterranean; it is rigged with three masts and lateen sails, similar to those of the Portuguese boat, described and illustrated at page 192. Feluccas were formerly much used by Greek pirates. In addition to the sails, these boats are often assisted by long powerful oars, during the frequent calms in the Mediterranean.

The yards used to spread the sails of the felucca are each—sometimes in two, three, and four parts—of bamboo or of light pine, the stoutest part being put in the middle, and the smaller parts lashed securely at the outer ends of the larger; thus the much admired bend of the lateen yard is greatly assisted, and a lighter yard is formed than if all in one spar; besides which, when an accident occurs to the yard, it is seldom that more than one part is broken at a time, which may promptly be restored.

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For general sailing in the smooth waters of the Mediterranean, the felucca is unrivalled; and when manned by an active crew of Spaniards, there are few English boats of equal size that can outsail them.

Feluccas are various in size, those used as coasters being smaller than the trading class. The long yards are seldom lowered to the deck, except in very heavy winds; when two sails only are used. Each sail can be brailed up close to the yard, by brail ropes attached to the throat of the sail; but they are more frequently frapped by the crew, who are exceedingly nimble in that performance, and run up the yards of the sails with peculiar agility.

Venetian Galleys.

Very similar to the felucca, not only in form and size, but historically, were the Venetian galleys.

So early as the ninth century, the galleys of Venice exceeded those of any other nation—indeed, they were then the most beautiful, as well as most useful, vessels of the age. But that was the period of ancient greatness of the Venetians—an age which has long since passed away; and the beautiful galleys of Venice are now superseded by the more sombre, but graceful and interesting gondolas.(1)

Maltese Galleys.

The galleys belonging to the Island of Malta were originally important vessels of war, used in the Mediterranean Sea. These also can be traced back to the same age as the felucca and Venetian galley; and in the three there has always been a strong similarity. In fact, the galley of Malta may stand as the representative of the whole class.(2)

The Maltese galley was a vessel furnished with a great number of oars, which are found very useful in the frequent calms of the Mediterranean. It was a long, low vessel, drawing but little water; it had usually three masts, and huge

(1) Described on next page.

(2) Charnock's 'Marine Architecture,' vol. iii.

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lateen sails, the middle one, or main-sail, being the largest. The interior of the galley was arranged with rowing-benches, where the crew, who worked the long, unwieldy oars, often underwent great hardships. The word of command was given by a person standing at the stern, who blew a whistle for that purpose; and thus a regular stroke of the oar was maintained. Some of these galleys were upwards of 150 feet in length, and thirty feet wide, and were propelled by fifty oars, each oar being fifty feet long, and balancing in the rowlock, which enabled it to be used with greater facility.

When about to board an enemy, the crew used to assemble on the 'rambade,' or platform, erected across the prow.

In sultry weather, a striped awning was spread above the deck, over the whole length of the galley, from stem to stern.

There is, in the United Service Museum, a beautiful model of a Maltese galley of the 18th century; and there is also one in the Kensington Museum.

The Mistico,

or Mystaco, of the Archipelago, is a decked vessel, with a long, low hull, used formerly by the Greek pirates; it was rigged with two short, stumpy masts and large lateen sails, much resembling the felucca of the Mediterranean.

The Gondola.

'Now rest thee here, my gondolier,
Hush, hush! for up I go,
To climb yon light balcony's height,
While thou keep'st watch below.

Ah! did we take, for Heaven above,
But half such pains as we
Take day and night for woman's love,
What angels we should be!'

T. Moore.

Among the objects of interest at Venice, that beautiful 'city in the sea,' none are more worthy of observation than the pleasure-boats, or gondolas and gondolettes.

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The Gondola.

The streets being principally canals, the gondola is the chief means of conveyance to and from all parts of the city. It is, in fact, as much in request on the Venetian canals as cabs and omnibuses in a large English town; and for the same purpose of travelling from one part of the city to another.

The only equipage of the noble or wealthy Venetian is his elegant gondola, in which he, his lady, family, and friends, are conducted to all places of amusement, visits to friends, and other excursions. Coachmen and grooms are supplanted by gondoliers and boatmen; the rattling sound of carriage-wheels is never heard; and nothing, save the plashing oar and musical cry of the gondolier, denotes the movement of the lifeless craft—

> 'And gliding up her streets as in a dream,
> So smoothly, silently,—by many a dome.'

The annual procession of the brides of Venice is thus poetically alluded to in an old legend:—

> 'And through the city, in a stately barge
> Of gold, were borne, with song and symphonies,
> Twelve ladies, young and noble. Clad they were
> In bridal white, with bridal ornaments,
> Each in her glittering veil; and on the deck,
> As on a burnished throne, they glided by.'

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The gondola is usually about thirty feet long and five broad, of peculiarly light and elegant form; and very elaborate workmanship is often displayed in the exquisitely carved and high-peering prow. A closed compartment is constructed in the centre for passengers, and fitted with windows, cushions, carpet, and curtains; much resembling the interior of a lady's and gentleman's carriage.

The gondola is generally propelled with a single oar, which is worked in an iron rowlock at the boat's quarter—the gondolier, or boatman, using it with graceful motion, to impel and guide the boat.

On approaching cross canals and corners, the gondoliers, by a musical cry, signal their approach, in order to avoid collision with other passing gondolas, which would otherwise frequently be inevitable.

The wonderful address displayed by the native boatmen in the conduct of their charge, the nicety with which they measure distances, and the quiet, progressive movement by which the gondola is made to glide through narrow canals, round sharp corners, among crowds of barges, boats, gondolas, and other craft, without ever touching a single obstruction, is very remarkable, and affords to strangers and others the most agreeable sensations of pleasure and safety in their transit to and fro on the Venetian canals.

So many poets have sung of picturesque scenes on the Grand Canal at Venice, and of the fair and lovely occupants of the gondolas and gondolettes, which at all hours of day and night are moving to and fro upon the still waters of that once magnificent city, that I make no apology for the following extract:—

'When the gondola is laden
With its light and lovely burthen,
There, with sturdy arm, the boatman
Rows Bettina o'er the billows
To a light and joyous measure,
Thus he warbles to Bettina,
While his cheek is flush'd with pleasure,
"Non v' è rosa senza spina."'

The Grand Canal is the fashionable parade of the Venetians,

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and in fact what the Champs-Élysées and the Bois de Boulogne, at Paris, are to the French, or Rotten Row and Hyde Park, in London, to the English. Gondolas are the Venetian equipages, the sombre colour of which shows off to advantage the gay dresses of the fair occupants, and the smart liveries of the gondoliers.

There was formerly so much rivalry in the magnificent manner in which these boats were painted and gilded, that it was considered expedient to establish a law prohibiting any other colour than black being used on the exterior of all passenger-vessels plying within the waters of Venice, the gondolas of State only being allowed gay colours; and the heads and sterns of these are, in some instances, gilded and richly ornamented, and the interiors fitted up in a very costly manner.

The gondolas belonging to certain Venetian corporations or societies, such as those of Chiozza, are also of more elegant and attractive proportions than those which are commonly let for hire, and they are generally decorated in an antique style.

The smaller gondolas, large enough for one or two persons only, are called *gondolettes*; these are as light and buoyant as the little wherries of the Thames, and are moved about very swiftly and with little exertion, but are rowed differently to boats of other European nations. The rowers in these sit facing the prow, and with a light pair of sculls, by a reverse motion, force the handle *from* the chest, instead of drawing it towards it.

Turkish Caïques.

Some of the caïques of Constantinople and other cities on the Bosphorus are as pretty, light, and graceful in form and construction as any boats in the world; so that it would appear there is something to learn in the art of boat-building, even from the Turks. In some respects the Turkish caïques are more slender and fragile than our famous Thames wager-boats. They are very flat-floored, and swim buoyantly on the water, though often heavily laden with a crew of eight or nine,

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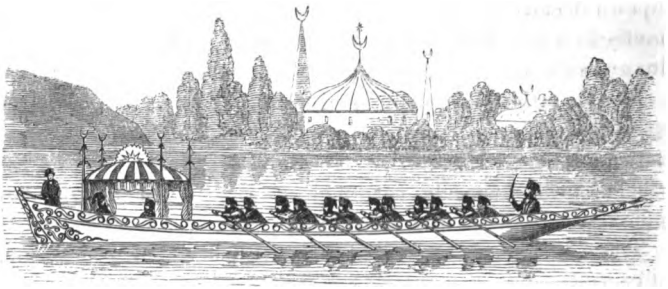

Turkish Caïque.

besides two or three passengers. They are lined throughout with thin polished wood, and fitted up with exquisite taste—elegant cushions to sit upon, and a carpet for the feet.

The prow and stern are particularly graceful, and often exhibit some elaborate carving, with the figure of a peacock, pheasant, or other beautiful bird, as an ornament to the prow. The upper sides are also finely carved; so also is the stern, back-board, and cross-rail at the bows; and these are also sometimes covered with gilt. Even the stretcher-boards, for the feet of the crew, are beautiful and delicate pieces of carved work, which yield with a springing elasticity to the muscular power of the rowers. The oars are very light and slender, and of a scientific and beautiful form; they are worked in brass rowlocks, neatly covered with leather.

Some of the State caïques, and those belonging to persons of dignity, are larger than those in general use on the Bosphorus. These are generally propelled by a very numerous crew, who sit double-banked, and row the caïque at great speed.

There is a tastefully formed canopy in the stern of these vessels, supported by light ornamental pillars, and hung with rich curtains and drapery, enclosing an elaborate cushion or wool-sack, in a rick silk covering, on which the ladies and other distinguished occupants of the caïque sit, or recline at their ease.

Among the many graceful caïques, with their long, sharp prows and gilded ornaments, there are several varieties. Some are seen freighted with a bearded and turbaned Turk, squatted

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upon his carpet at the bottom of the boat, pipe in hand, and muffled closely in his furred pelisse, the very personification of luxurious idleness.(1)

Some are broad and powerfully formed boats, others so narrow and ticklish that it is safest to sit on cushions in the bottom of the boat. They shoot along very swiftly under oars, when manned by an active crew. Some are occasionally sailed, under one or more lateen sails.

There are also caïques of slender and exquisite form, made of carved and polished walnut-wood, their minute gilded ornaments glittering in the light, as they glide to and fro.

'From the gilded barges of the Sultan to the common passage-boat that plies within the port, the caïques are all beauty; and as they fly past you, their long and lofty prows dipping downward towards the current at every stroke of the oars, you are voluntarily reminded of some aquatic bird, moistening the plumage of its glistening breast in the clear ripple.'(2)

'The long, dark, crescent-shaped caïque, immediately in the wake of the Sultan, with its three gauze-clad rowers and its flashing ornaments, carries a pasha of the imperial suite. He is hidden beneath the red umbrella which the attendant, who is squatted upon the raised stern of the boat, is holding carefully over him.'(3)

'You may see a third bark just creeping along under the land—a light, buoyant, glittering thing, with a crimson drapery, fringed with gold, flung over its side, and almost dipping into the water. A negress is seated behind her mistress, with a collection of yellow slippers strewn about her; and at the bottom of the boat, reclining against a pile of cushions, and attended by two young slaves, you may distinguish the closely-veiled Fatma or Leyla, whose dark eyes are seen flashing out beneath her pure white *yashmac*, and whose small, fair, delicately-rounded, and gloveless hand draws yet closer together the heavy folds of her *feridjhe*, as she remarks the approach of another caïque to her own. She is the wife of some pasha—

(1) 'The City of the Sultan,' by Miss Pardoe.
(2) Ibid. p. 228 (4th ed.).
(3) Ibid. p. 229 (4th ed.).

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the favourite wife, it may be—musing, as she darts along the water, with what new toy her next smile shall be bought.'(1)

Fruit Caïques of the Bosphorus.

'And this slowly-moving bark, rather dropping down with the current than impelled by the efforts of its two Greek rowers, and which looks so cool and so pretty, with all that pile of green leaves heaped upon its stern, is one of the fruit caïques for the supply of the houses overhanging the Bosphorus. The wild, shrill cry of the fruiterers, announcing the nature of their merchandise, swells upon the air; and as you pass close beside the boat, the wind, sporting among the fresh branches that are strewn over the baskets, blows aside the leaves, and the tempting fruit is revealed to you in all its cool, ripe beauty.'(2)

The caïquejhes (native boatmen) are, generally speaking, a very fine race of men; and they take a pride and delight in the cleanliness of their boats, keeping sponges and brushes for wiping and cleaning them, and soft leathers for rubbing the brass and ornamental work, and they always take off their shoes before stepping in, and never suffer any one to get in with dirty boots.

No one is allowed to sit in the raised parts of the graceful bows and stern, for fear of disturbing the trim of the boat, besides disfiguring the elegant carving and fancy-work. Strangers are assisted into the caïques with the greatest care, and luggage is removed with nice caution and quiet management. On landing their passengers, the caïque crew always turn the boat, and back ashore stern foremost.

SWITZERLAND.

Boats of the Lac de Genève.

Sailing-boats appear to the prettiest advantage on the beautiful blue, transparent lake of Geneva, surrounded as it is by

(1) 'The City of the Sultan,' p. 229. (2) Ibid. p. 229.

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the most bewitching scenery, and frowning upon its banks are some of the grandest mountains in the world.

The lake itself is upwards of fifty miles in length; in the widest part it is over nine miles in breadth; and near Chillon, which is its deepest part, it is 600 feet in depth.

One of the greatest peculiarities of this lake is the deep blue colour of its water; and in this respect it differs from the other Swiss lakes, which are all more or less of a light green colour.

At the south end of the lake, which is narrow, the water becomes contracted, and so rushes through the town of Geneva with the rapidity of an arrow. Indeed, boats are prohibited from approaching the *Pont des Bergues*, on account of the dangerous rapidity of the current; and so, too, in some other parts of the lake, the currents caused by the rising of subterraneous springs are sometimes so strong and rapid that no oar can resist them.

The sailing-boats (*voiliers*) of the lake of Geneva are various both in form and rig. English and American models also adorn the Swiss lakes. The American broad and shallow form of hull appears to be much in vogue among some of the foreign residents, many of whom keep their little yachts or pleasure-boats, some of which are rigged as English cutters, sloops, or schooners. Most of the American models have the mast in the very bows, with the heel stepped in the lower part of the stem-piece, and these are sailed, as in England and America, under a single gaff-sail, like a cutter's or sloop's main-sail.

Although there are many boats on this lake built upon the American broad and shallow form of hull, still they are not all provided with the centre-board keel.

The prevailing or native rig is the lateen, though some of the trading or cargo-boats are fitted with a long-shaped square-sail, like a large roll window-blind. There is a peculiarity about the hull of these native cargo-boats such as is never seen in the boats or barges of other nations; they have, in fact, flanging sides, or wings, extending outwards, like the broad fins of a flat fish, beyond the sides or gunwale of the boat itself, but so constructed as not only to provide an immense space of

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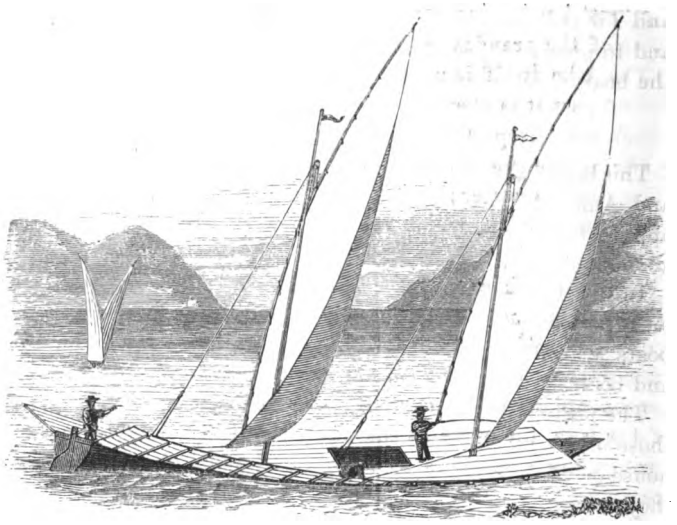

Cargo-Boat of the Lake of Geneva.

broad deck for stowage and conveyance of light goods, but also to hold the vessel up under sail, in case of any sudden lurch or undue pressure of the wind. These boats have also very high bows and sterns, so that both ends stand considerably above the water. They are rigged with two masts and lofty, pointed lateen sails, which they shift into various positions with considerable tact, according to the quarter from which the wind blows, or the course they wish to steer. These boats are very pretty objects under sail, from whatever quarter of the lake they are viewed.

The lateen sails are not reefed, even in the large boats, but brailed up, more or less, as required; or one is dispensed with, the peak lowered, or otherwise, as occasion may require.

On encountering a storm or bad weather, they are enabled to make for a harbour of refuge in a very short time, as both sides of the lake afford frequent places of shelter.

One of the greatest disagreeables encountered in the neighbourhood of the Swiss lakes is the heavy rain, which sometimes half fills an open boat in the course of ten or twelve hours;

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and for this reason, when it is wished to keep the sails white, and to preserve them from mildew, they are not left about in the boat, but rolled up and taken away.

Boats of Lake Zurich.

This beautiful lake is also studded with many boats of English and American rig, the broad and shallow form of hull being apparently the favourite, for the lake itself is very shallow about the town of Zurich, and on various parts of its shores.

In the American models the mast is stepped as far forward, or rather as close to the stem-piece, as possible; and these boats are generally sailed under a single sail, fitted with gaff and boom.

The native pleasure-boats are mostly rigged as lateens, like those of the Lac de Genève; but some of them have a wooden house or deck, like the Chinese boats; in the absence of which they mostly have a canopy or awning over the middle and aft part.

The trading or cargo-boats of Lake Zurich are a useful and burthensome sort of craft, of barge-like structure, flat at the bottom, but very broad amidships, and with flanging sides, like those of the lake of Geneva, and high-peering and sloping bows and stern—the latter not pointed at the extreme ends, but broad —and the stern is generally higher than the bows, particularly when the boat is laden. Steps are formed in the slope of the bows, from the top to the floor of the vessel; and the same at the stern. The steps are of the greatest convenience in carrying goods in and out of the boat from the quay or wharf; and a further advantage is, that instead of occupying a space to the extent of their whole length, when lying alongside the wharf, they lay stem or stern on, and thereby only occupy their *width* of space, instead of length. And in that position they are loaded and unloaded from the banks of the lake with every facility, by means of the stepping-slope.

These boats are fitted with a very tall, slender mast, placed nearly amidships, and upon which they hoist a long-shaped square-sail when the wind is fair. In calms and adverse winds, they are propelled by the crew with long oars or sweeps.

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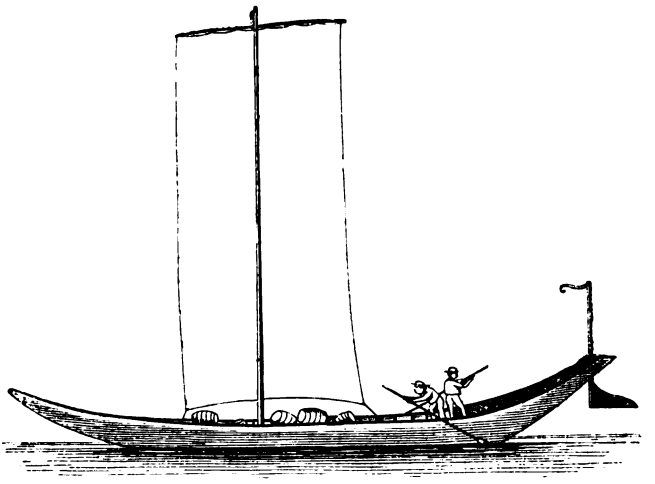

Cargo-Boat of Lake Zurich.

The rudder is placed at the extreme end of the stern; and when its services are not required, it is hoisted up above the water, in the manner represented by the above engraving.

Boats of the Lakes Lucerne, Thun, and Brienz.

There is a great similarity between the pleasure and passenger-boats of the lakes Lucerne, Thun, and Brienz. They are mostly of a broad and shallow form, with very high bows; but the stern in some of them is scarcely higher than the midship section of the boat, and is broad and flat on the outside. These boats are provided in summer with a canopy, or tilt, amidships, under which the passengers sit, so that the boatmen have both ends of the boat to themselves for the management and navigation.

In the fore part, near the bows, they place the mast, upon which they hoist a small lug-sail. When there is no wind, they strike the sail and ply their oars in the aft part of the boat.

These boats are built of fir-planking, about an inch in thickness, fastened to stout timbers and knees. They are about twenty-two feet long, by five feet wide at the top; but at

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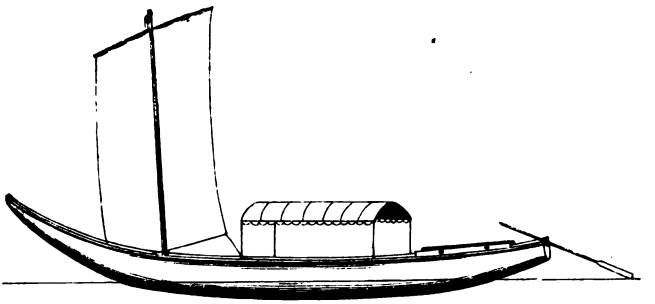

Boat of Lake Thun.

the bottom, which is flat, they are about sixteen feet in length, by three in breadth.

On Lake Constance similar boats are employed; also large cargo-boats or barges, rigged with tall masts and large square-sails; and some are rigged with a gaff-mainsail and fore-sail.

BOATS OF THE ITALIAN LAKES.

THESE boats, like those of the Swiss lakes, have considerable rake both fore and aft. Thus a boat twenty-three feet long, by seven feet wide, has five feet rake at the stem, and three feet at the stern; the bottom being flat, and only three feet wide, but flaring out to the width of seven feet at the top. The sides are nearly flat; the bow rises slightly, and the stern a good deal. A canopy is erected in the middle, over the seats destined for the passengers; this is supported by three broad hoops, in the form of arches.

In the boats of the Lago Maggiore the lower part of the canopy frame forms an outrigger, in which thowls are fitted for the oars; and in the boats of this lake the canopy is in the fore part, the frame of which is slight; but in the boats of the Lago Lugano and Lago di Como the canopy is in the aft part of the boat, supported by a stout framework of broad wooden hoops.

These boats all have large rudders, and are generally sailed

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under a square-sail, made of thin home-spun flax or hemp. The mast, in some of the boats, is without either block or sheave-hole, but has a fork at the top, over which the halliards go, and are belayed in the aft part of the boat, in the most primitive manner.

The sheet is usually hitched to one or other of the hoops forming the archway of the canopy. The sail is sometimes ornamented with coloured stripes or checks, and not unfrequently is bent to the yard with strips of its own material.

Many gentlemen who have villas on the banks of these lakes are provided with boats of English form and rig; these are not, however, copied by the natives.

NORWEGIAN BOATS.

Norway Yawls.

'For now in our trim boats of Noroway deal,
We must dance on the waves with the porpoise and seal;
The breeze it shall pipe, so it pipe not too high,
And the gull be our songstress whene'er she flits by.'
Claud Halcro's Norse Ditty.—'Pirate.'

The Norwegians are in no way behindhand with other nations in the ingenuity displayed in boat-building. Their common boats are of two classes—yawls and prahams, or praams. The manner in which they are constructed is very remarkable, and purely original; they are built of the Norway pine or fir, and entirely without nails, the planking being joined and fastened throughout with wooden pegs. In shape and model the two classes are totally different. The yawls are crescent-shaped at the top and of wedge-like form at the bottom; whilst the prahams are round-bottomed, though nearly flat, like a butcher's tray or a boat-scoop without a handle. Small-sized Norway yawls are used chiefly for rowing, and the larger ones for sailing. The general rig under which they are sailed is a single lug-sail, the lower part of which is considerably broader than the upper.

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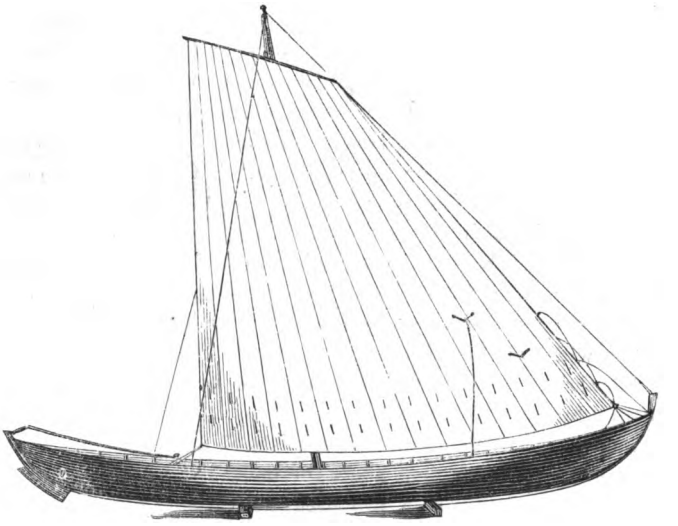

SONDMORE BOATS.

The fishing-boats of Sondmore, on the west coast of Norway, are very fine and beautiful open boats, in form alike at both ends, but long and graceful-looking, though built without a gunwale or top-rim—the boat merely consisting of ribs or timbers and the outside planking, with high stem and stern-pieces, and rather deep keel. The rudder is large and broad at the bottom, extending below the keel, and provided with a very long tiller, which fits into an elbow attached to one side of the rudder's head. The tiller is long enough to reach nearly to midships; so that there is no occasion for any one to burden the boat by sitting in either of the ends; and the helmsman may sit just abaft the mast, and steer the boat with ease—a great advantage when under sail in a heavy sea.

The rig of these boats is an excellent one. It consists of a very useful and ingeniously contrived lug-sail, very narrow at the top, but broad at the bottom (see engraving); and there

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are the same number of cloths in the top of the sail as in the lower part, the canvas being worked gradually narrower all the way up. The mast is rather lofty, and there are several shrouds or stays, leading from the top above the short little yard, that are held down or made fast *in* the boat (not to the gunwales or rim, for the boat is destitute of both) by means of little wooden fids or thumb-cleats. There is also a fore-stay, that is made fast to the stem.

The sail is set in the fore-part of the boat (see engraving), and the tack is made fast at the inside of the stem. The reef-tackle forms an important part of the rigging, and is very complete; two reefs reduce the sail considerably, it being so much wider at the bottom than at the top.

The lower part of the boat is divided into several compartments by bulk-heads, which reach up to the level of the thwarts. The ballast (which consists of a few large stones) is placed amidships, just abaft the mast.

These boats are also provided with long powerful oars, which are worked, not between thowls, but in straps, with a pin or standing-bit for leverage; the loom of the oar, where it chafes, is squared.

A very complete and beautiful model of one of these boats was exhibited in the International Exhibition of 1862.

Nordland Fishing Boats.

The fishing boats of Nordland (north of Norway) are nearly similar in form, though not in rig, to those of the western coast, but not quite so raking at the bows. They are rigged with a lofty mast and lug-sail, though not nearly so pretty in shape as the Sondmore boat-sail; it is, in fact, a mere long-shaped lug-sail, without a peak, but a little broader below than at the top. These boats also have bulk-heads, similar to those last above described.

Finmarken Fishing Boats.

The boats of Finmark are similar to those of the west coast of Norway, as regards the form of the boat and being *minus* both rim and gunwale; the stem, however, is by no

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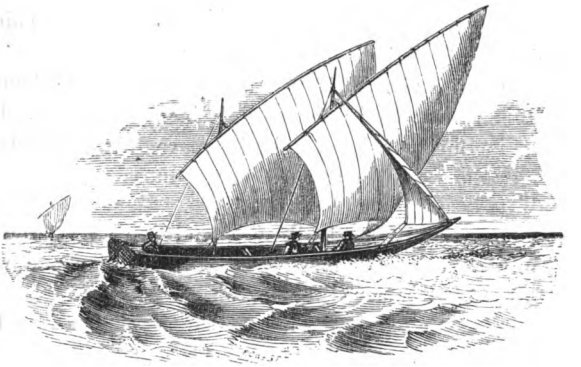
means raking, but rather inclining inwards at the top, and therefore presenting a full or prominent fore-gripe. They are rigged with an ugly square-shaped lug-sail.

The fishing boats of Drontheim are nearly identical with the Finmarken boats, both in form and rig.

The larger or decked fishing boats of Finmark are of stronger build than the others, and have square sterns; they are rigged as cutters, but not very gracefully. They have a cabin-house amidships, which occupies the entire breadth of the boat.



THE PRAAM.

The Praam, or Praham, is also a boat of Norwegian contrivance, and of peculiar form. The praams, like the yawls, are built of Norway deal, and without a single nail, being tacked together by means of wooden pegs; notwithstanding which they are very secure, as well as strong and durable.

The shape of the praam is very similar to a wooden boat-scoop without a handle, having a broad, round bottom; the greatest breadth of beam is at the stern, the head and bows gradually rising forward, and sometimes finishing with a carved figure-head. Small praams are used exclusively for rowing; these, in general, have no keel.

The sailing-praam requires a good depth of keel at the stern, on account of its very flat floor, and the buoyancy with

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which it sits upon the water. Some of the largest of these boats sail remarkably well, when judiciously rigged and ballasted.

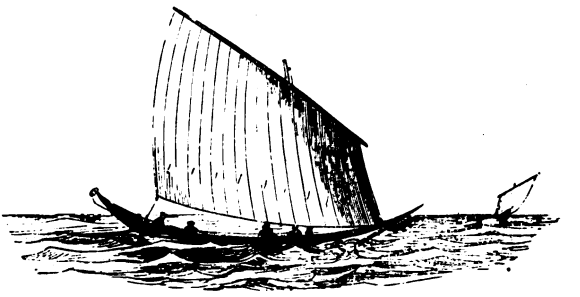
The engraving represents a large sailing-praam, fitted with two masts and lug-sails, running before the wind, with the fore-sail hauled aweather—a common method of steadying a boat in a sea-way.

The boats employed on the coast of Denmark are very similar to the Norway boats, especially the praams, some of which are longer and narrower than the Norway praams, and have, besides, a long tapering bow.

Norwegian Pilot-Boats.

The pilot-boats of the south-west coast of Norway are rigged with three sails, viz. sprit-sail, fore-sail, and jib; but the sprit-sail is rather unsightly-looking, inasmuch as it has no peak, but is purely a longitudinal square. It is fitted with four reefs; the fourth, or uppermost, reduces the sail to less than half its size.

These boats are decked all over, and have no bulwarks, but simply a stout rail on each side, amidships, extending nearly to the bows forward, and within a few feet of the stern. The rudder is large, and broad at the lower part.



Faroë Islands Fishing Boats.

The fishing boats of the North Faroë Islanders are much like the yawls and boats of the western coast of Norway. They are of crescent-like form, and have very high-

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peering stem and stern, which are both alike; they have a deep keel and rather deep rudder. These boats are rigged with a lug-sail of English-like shape, widest at the bottom; but the tack is not generally hooked so far forward in the bows as usual with English boats.

The oars are heavy-looking, with square-shaped loom; they are worked in leather straps, secured to the sides of the boat, with standing-bits for leverage, similar to the Norway fishing boats.

The Faroë Islands boats sail remarkably well; the large-sized ones in particular, which are fine-looking craft, and good sea-boats.

LAPLAND BOATS.

All the boats of the Laplanders (even the large ones) are extremely light; they are made of a few very thin planks of fir, attached to a keel and ribs, the planks being sewn together with sinews of the reindeer, which resemble English catgut. This light form of boat is rendered necessary by reason of the number of cataracts that are so frequently met with on the rivers and lakes of Lapland.

In some parts of that country, where the natives are enabled to procure cord or twine, they use it in boat-building, instead of the sinews of reindeer; but before doing so, they generally rub or dress it with a kind of red glue, which they prepare from the skins or scales of fish. (1) The cord or twine, on being dressed with the glue, is rendered much more durable, and is impervious to air and water.

The small fibrous roots of the fir are also sometimes used by the natives in boat-building, when neither cord nor sinews can be procured. (2)

The skiffs of the Laplanders are of fragile and peculiar construction. The keel is about one fathom in length at the bottom, but extending to two fathoms upwards, being equally high and pointed at each end. The floor is rather flat in form. The ribs or timbers on each side are only three or four in

(1) Regnard's 'Journey to Lapland.' (2) Ehrenmalm's 'Travels in Lapland.'

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number, and very small; these are covered and doubled with thin fir planks, that are joined with the sinews or other cordage before mentioned. When completed after the strongest manner, a man might crush them between his arms; and on stepping in and out, care must be taken to tread only on the bottom, for any hard pressure on the sides would injure them.

FINLAND BOATS.

THE boats of Finland are also extremely light, being built after the same manner as those of Lapland.

They are made of thin strips of fir, sewn together with the sinews of the reindeer, or dressed cord, and fastened to a skeleton composed of a keel and ribs; and being so constructed, they are buoyant and flexible. But, notwithstanding the lightness and flexibility of the materials of which they are composed, these boats are very strong; for, when borne by the violence of the torrent, and exposed to rough usage, frequently striking against stones and rocks which abound in the rivers of that country, they appear to bear such shocks without injury; and for such usage the mode in which the planks are joined together is better than if secured with clenched nails, for a boat of elastic or flexible construction is more capable of sustaining, without injury, a bump against hard rocks than one of firm and unyielding mould.

Many a stranger would be struck with alarm on first witnessing the perils to which these boats and their occupants are exposed, when borne rapidly down a torrent of waves, foam, and stones, in the midst of a cataract; the noise of which is so deafening that it is useless for any one of the crew to attempt speaking to the other—all must be done by signs, and the boat controlled by individual skill and courage. The Finland boatmen are particularly bold and skilful in the management of their boats in cataracts, and are everywhere else ingenious in steering small vessels. One dauntless Fin stands at the stern, and steers with an oar, whilst two others row as hard as they can, in order to escape the danger of quick-following waves,

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which threaten to overwhelm them. The perils encountered on passing through some of these cataracts are astonishing, and the boats are driven along with great rapidity, apparently diving into waves and raging torrents of foam, as if never to rise out of them, and then again appearing on the crest of a lofty wave, with keel exposed to view, and disappearing again as if going down endwise; and during these perils there are others around, in the shape of rocks, stones, and other obstructions, which, by judicious steering, the pilot has to avoid. (1)

In the travelling-boats of Finland the Fins always insist on the passengers landing when they come to a dangerous cataract; and in this they consult their own interest, as well as the safety of the passengers; for the lighter and more buoyant their boat, the less is the danger incurred.

Most of the larger boats are furnished with a lug-sail, and a mast that can be raised and lowered at pleasure. Sails are found of great service to the boats of this country, where smooth rivers and lakes abound, though often intercepted by dangerous cataracts; and it is in passing through these that the calmness, courage, and skill of the Fins are particularly conspicuous. (2)

BOATS OF HOLLAND.

The Boëyer Rig.

The Dutch pleasure-boats have many peculiarities, both as regards the form of hull, and the rig and cut of their sails; and notwithstanding the fact that they are neat and trim-looking boats, they have a somewhat antiquated appearance—at least in English waters and from an English point of view. They are very strongly built, with round sides, broad beam, and flat floor. They have a good deal of dead wood, both at the foregripe and stern, but no false keel amidships; so that, when run aground, they sit perfectly upright. There are no upper projections as regards stem or stern; but the rudder is very large, and

(1) Pinkerton's 'Voyages and Travels,' vol. i. 'Journey of Maupertius.'
(2) 'Journal of a Voyage to the North,' by M. Outhier. (Trans.)

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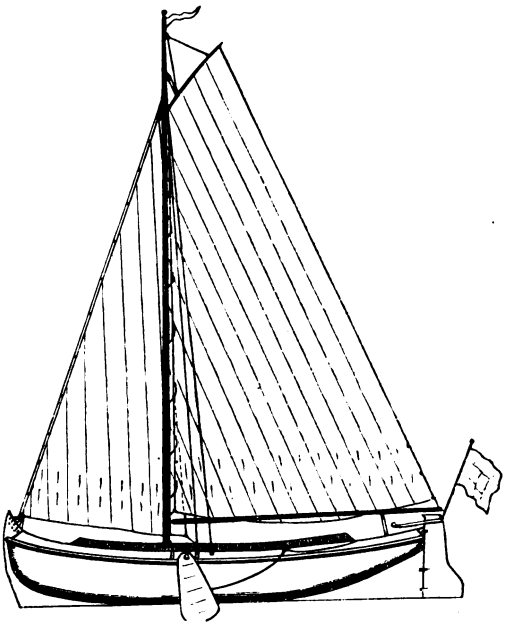

The Boëyer Rig.

forms a very conspicuous object outside the stern and stern-post of the vessel. They are provided with lee-boards, which supply the place of false keel. These are suspended, one on each side of the vessel, to an iron bolt or pivot, so that, by means of a small tackle, they may be let down or hauled up, as required, when the vessel is under sail. The lee-board on the lee-side is lowered when reaching or working to windward; but if the wind be free, the services of the lee-boards are not required, and they are then hauled up.

The hull of Dutch pleasure-boats, externally, is seldom painted, a decided preference being given to bright varnish, which gives the wood a rich brown polished appearance, the upper or bulwark-strake only being painted, usually with a very bright green, and picked out fancifully with white and red. Much labour is sometimes expended on the stern and aft

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body of Dutch pleasure-vessels, the carved workmanship of which is beautifully polished, and ornamented with gildings. A number of carved and polished, wooden fend-offs are usually hung over the bows on each side of the vessel; and whilst they are useful in saving the sides from scratches and bruises, by craft coming alongside, they are also fanciful and ornamental to the vessel.

Dutch yachts and sailing-boats are almost invariably fitted either under the Boëyer or the Spiegel rig. The Boëyer rig is the one used for small yachts, and the Spiegel for large ones. The gaff-mainsail of the former is lofty, but very narrow at the head, and, consequently, requires only a very short gaff. The mast, a tall one, is placed in an upright position, and the lower part of the sail does not extend beyond the outer end of the stern, so that the main-sail looks tall and narrow. The fore-sail, which has also considerable hoist, is a tall, narrow-looking sail, attached to the fore-stay. No jib is used, the Boëyer rig consisting of two sails only, neither of which extend beyond the deck of the vessel fore and aft.

A Dutch Boëyer yacht, twenty-four feet in length, is usually about seven feet in breadth.

The Spiegel Rig.

The Spiegel rig differs slightly from the Boëyer, but in two respects only. In the first place, the main-sail of the Spiegel rig is a little wider at the head than in the other; and, in the next place, the rig consists of three sails, instead of two—a bowsprit and small jib forming part of the Spiegel rig, but not of the Boëyer. The mast is very lofty, in proportion to the length of the boat; for instance, a yacht forty feet in length by thirteen in breadth, and drawing only four feet of water aft, by three and a half forward, carries a mast fifty-six feet above the deck! All the sail, with the exception of the jib, is inboard, the boom of the main-sail not extending beyond the extreme end of the stern.

The hull of the Spiegel-rigged yacht is similar to that of the Boëyer, as will be seen by the engraving on next page, the chief difference being as regards the stern and aft quarters, and the

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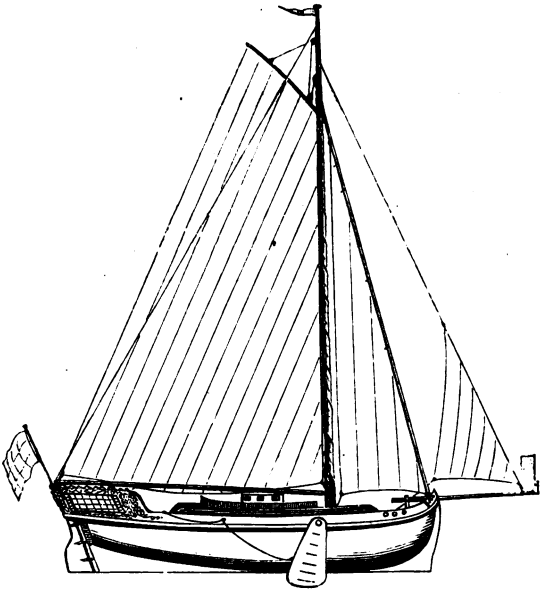

The Spiegel Rig.

deck arrangements. When full-rigged, they carry a large flag-staff and flag at the stern, and a very tiny one at the tip of the bowsprit, as shown in the engraving.

A peculiarity applicable to both rigs, and indeed to Dutch vessels generally, is, that the lower end of the fore-stay is secured to the stem at the bows of the vessel, by means of several lanyards rove through a number of holes in a large dead-eye; the lanyards forming a dozen or more separate parts, and these are drawn tighter, or loosened, as occasion may require, on setting up or adjusting the trim of the fore-stay.

Fishing Schuyts.

The Dutch fishing schuyts are of similar form of hull to the Dutch vessels above described, but of heavier and broader construction, and less graceful proportions; and they are very flat-floored.

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They are rigged with less canvas, in proportion to the size of the hull, and have shorter masts and lighter spars, than the pleasure-vessels; but all have lee-boards, which they use when sailing *on* a wind, to prevent lee-way. These boats come on voyages from different parts of Holland to the north and east coasts of England, with the fair winds of March, to fish in the Channel, in company with the English and French fishing smacks.

Having once arrived at the fishing-ground, be the weather ever so rough, they seldom make for a harbour, but generally ride out the gales at anchor, or drive about at sea, laid-to, with fore-sail hauled aweather. When provisions are wanted by the crew, the schuyts are run ashore on the open beach, under shelter of some bay or inlet, where they remain until the crew have made all necessary purchases. The floor of these vessels is of so flat a construction that, when aground, they sit perfectly upright; and such appears to be a very important consideration in the construction of Dutch sailing vessels.

CHINESE BOATS.

'I saw their boats, with many a light,
Floating the live-long yesternight.'

THERE is no other nation in the world where so great a variety and such thousands of boats are met with, as on the rivers and at the sea-port towns of China. But it is very remarkable, that although there has been considerable advancement and improvement of late years in the art of boat-building by the Chinese—some of their modern boats being as perfect in model, and as elegant in form, as those of any nation—yet the advancement of the Chinese in naval architecture in no way keeps pace with the sister trade of boat-building. The same form of Chinese junk which furrowed the deep centuries ago, with its high towering stern and lofty mat sails, still navigates the seas in that same antiquated form; and this, too, although the Chinese have daily before their eyes the splendid ships of England, France, America,

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and other nations, alike famed for skill and advancement in naval architecture, and whose vessels are adapted for quick voyages, capacity, and convenience as trading ships, and comfort and safety at sea in hard gales. But notwithstanding that the Chinese people are fully aware of these facts, they appear totally careless and indifferent of such advantages, and adhere to their favourite old junks and lorchas, as if they possessed a superiority over every other form of vessel in the universe.

It is stated by Dr. Downing, in his 'Fan-qui,' that 'the boats on the Chinese rivers are, in the most essential respect, the same as houses of other nations on the land. They may be compared to the habitations of people living in a great city, and you soon become accustomed to look upon them in the same light.'

And by another author it is said, that 'from Whampoa to Canton the river is like a crowded highway, on which junks, ships, and boats jostle one against another like 'busses and cabs in a London street, managing with similar dexterity to avoid collision.' (1)

At Canton, the crowd of boats—of all sizes, shapes, and colours, passing to and fro, with the 'hubbub and clamour of ten thousand different sounds, coming from every quarter, and with every variety of intonation—make an impression almost similar to that of awe, upon the first visit of the stranger.' (2)

The Chinese annual Feast of Lanterns takes place in August, when the boats are nightly covered with variegated lanterns, hung from the sides and rigging; which, with their reflections, have a very pretty effect, particularly when viewed from a commanding position.

There are few more extraordinary places than the Canton river, supporting as it does a vast population, which inhabits the numberless boats of all forms and all sizes. (3)

(1) 'Recollections of a Three Years' Residence in China,' by W. T. Power, D.A.C.G., 1853.

(2) 'The Fan-qui in China,' by C. T. Downing, Esq., 1838.

(3) 'Rambles of a Naturalist on the shores and waters of the China Sea,' by C. Collingwood, M.A. &c. (1868), p. 333.

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Besides the sampans, or common covered boats, there are many palatial craft, with elaborately-carved and gilded fronts, which in the evening show a blaze of light, and busy waiters moving about among the feasting Celestials, and painted Chinese women mixing with the crowd—not unfrequently gambling-houses, or places of licentiousness and debauch. It is altogether a scene not to be forgotten; and as night advances, the streets of boats are extended by the crowds of sampans which have been plying during the day, but which at sunset take up their stations side by side in the canals, within which they are secured by a boom, just as the gates of the city are kept closed during the night. (1)

As evening comes on, also, numerous large house-boats, two storeys high, richly decorated and ornamented, return from their various pic-nic excursions, a number of half-naked Chinamen poling them slowly and laboriously along. Meantime groups of the better class stand at the door, enjoying the scene; and others may be seen through the windows, seated in the saloon, drinking tea and smoking; while the upper windows disclose many fair ladies in their boudoirs, adorning themselves for the delectation of their lords. (2)

At Canton every boat is registered, whatever its size. In the year 1833, the whole number on the river adjacent the city at Canton was eighty-four thousand, a large majority of which were tankeä (i.e. egg-house) boats.(3) Many thousands of the Canton boats were swept away and completely destroyed by the terrible typhoon in August 1862, and upwards of forty thousand persons were lost in that memorable disaster.

Chinese River Junk.

Although tens of thousands of boats be assembled together on the Chinese rivers, yet good order and decorum is kept to a certain extent. All boats with the same kind of goods are moored together in tiers, at a certain place on the river allotted to them by the local magistrates; and watchers and other officials are appointed and set over them, both by night and

(1) 'Rambles of a Naturalist on the shores and waters of the China Sea,' p. 333. (2) Ibid. p. 333. (3) 'Chinese Repository,' vol. i.

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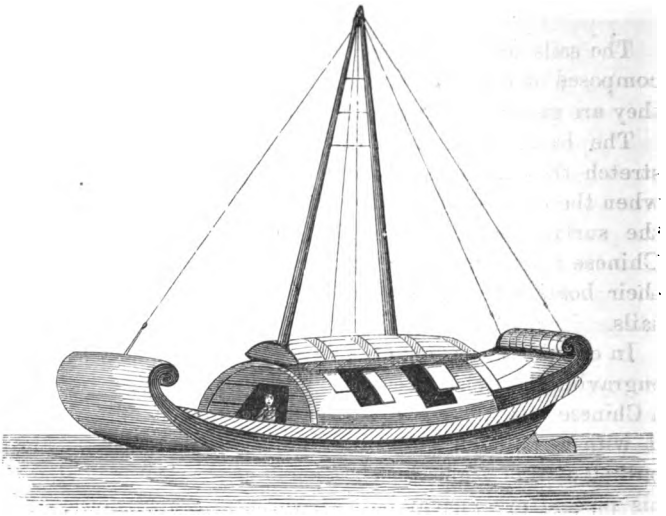

Chinese River Junk.

day,(1) to enforce regularity and conformity to the orders of the magistrates. Fairs and markets are also held on the river; and trades of all kinds are carried on by the people, who form the aquatic population of the Chinese rivers.

Many of the boats which are brought out at regattas, and on gala days, are beautiful models of light and elegant workmanship. But many of these appear to be copies of English wager-boats, galleys, and such like; and the imitation is admirable. The Chinese boat-builders are said to keep the few English wager-boats they have as models from which to make their own. The only astonishment is, that the ship-builders have not done the like as regards ships.

All the Chinese *sea-going* craft have a great goggle-eye painted on each side of the bows; the river craft alone are without that ornament. And instead of iron, they use generally *wooden* anchors, which, though clumsy and inelegant in appearance, are tolerably efficient.

(1) Nieuhoff's 'China.'

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Chinese Sails.

The sails of the superior class of Chinese boats, although composed of matting and bamboo, are ingeniously made; and they are generally remarkably well cut.

The bamboos, which are passed across the matting to stretch the sail, leave the intervening spaces loose; so that when the breeze fills the sail, the edges become scalloped, and the surface presents a pretty wave-like appearance. The Chinese handle these sails with great dexterity, and some of their boats sail remarkably well under a good suit of mat sails.

In one of the plates to Sir George Stanton's 'China,' is an engraving, styled, 'Economy of Time and Labour.' It exhibits a Chinese waterman sitting at ease in a sailing-boat, steering it with one hand, managing the sail with the other, and pulling a large oar with his foot, at the same time smoking his pipe with perfect *nonchalance*. It appears that in China very large boats are frequently managed by one man, who, with great dexterity, will run full sail through a whole fleet of vessels, in the manner represented.

Instead of pitch, the Chinese use a cement like putty, which Europeans call 'chinan.' (1)

Chinese Mode of Paddling.

The paddles used by the Chinese boatmen are made of light wood, shaped after the manner of a garden spade. They use the paddle on one side only of the boat, holding it with one hand on the top, and placing the other about a third from the bottom. In this manner the upper hand steadies it, whilst the lower one drags it horizontally backwards. By a repetition of strokes, the boat is drawn ahead; and in order to prevent its driving too much on one side, on account of the force being all on one quarter, the paddle is inclined more or less inwards or outwards, as may be necessary, at the close of each stroke, so as to guide the boat as if by a rudder. Persons unaccustomed

(1) Osbech's 'China.'

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to such a mode of paddling would find it a difficult art, as the little sampan would spin round and round like a whirligig, but the Chinese manage them with a good deal of skill. Dr. Downing says he has seen a little girl ply the paddle so dexterously as to send a boat straight as an arrow across the current of the river, when an English sailor has given up the experiment in despair, and drifted fast to leeward.

Family Boats.

On entering a Chinese port, a stranger would think half the population lived in boats, and, indeed, there are thousands of families living throughout the summer entirely in boats.

These family boats are constantly cruising up and down the river in pairs. When at anchor, they are arranged in regular tiers, forming liquid streets for small craft to move up and down among them, and broad channels for the larger vessels. The lesser craft are managed with uncommon dexterity by the men and girls, who paddle and push them about, threading their way through the maze among the never-ceasing noise and jabber of countless thousands of voices. Screaming and helpless little children are also crawling about the decks, with hollow gourds or bladders tied at the back of their necks as life-buoys, (1) to keep their heads above water when they tumble overboard; and with the same they are taught, in infancy, to swim.

The family boats all have wooden or bamboo cabins or houses, of a size in proportion to that of the boat.

Chinese Fast-Boats.

The hull of a Chinese fast-boat is about thirty feet in length, by eight or nine in breadth, much higher out of the water abaft than forward, and fitted with a large flat-roofed cabin in the centre, the other parts being decked over with moveable boards, and arranged into compartments, as cupboards and kitchens. They are exceedingly comfortable inside. When

(1) Power's 'China.' Downing's 'Fan-qui.'.

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there is little or no wind, oars are employed, and a cabin-house is erected overhead, as a protection from the intense heat of the sun. This is taken down when a breeze springs up, and the sails are hoisted.

These boats are rigged with two masts and sails, the masts being stepped, and supported by shrouds and stays in the usual way. The sails consist of squares of matting sewn together, and spread with a bamboo yard at the top (as lug-sails); also with cross-pieces of lighter bamboo below, at the distance of two or three feet asunder, all the way down the sail, for the purpose of stretching and strengthening it.

The halliards are rove through a block at the mast-head, and the yard is slung in the usual way as for a lug-sail. As the sail is hoisted, pieces of string fasten, in a loose manner, the cross-pieces to the mast, keeping the sail from flying away, but yet allowing it to traverse freely up and down.

The sail is controlled by numerous guys, or pieces of cord, fastened to the yard end, or peak of the sail, and the extremities of the cross-pieces. These are all collected, as a bridle, by means of clumsy wooden blocks without sheaves, and ultimately terminate in a single rope or main-sheet, which is belayed upon deck. The rudder is large, and, as Dr. Downing describes it, would be well represented by a moderate-sized grating, with a small capstan-bar attached. It is made to lift up, so as not to exceed the draught of the vessel in shallow water.

Although these fast-boats are by no means strongly built, they are so light and buoyant as to be able to live at sea in the roughest weather, when strong heavy vessels of the same size would assuredly go to the bottom.

In these boats the Hong-Kong merchants make voyages to Canton and other places.

The voyage to Canton, a distance of eighty miles, is generally performed in about thirty-six hours, but until recently it was no very uncommon thing to be attacked on the passage by pirates. To guard against such outrages, the fast-boats are generally provided with guns, pistols, and other weapons.

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Chinese Pleasure-Boats.

Some of the sailing pleasure-boats of the Chinese are admirable models, though original and peculiar in appearance, with their broad and high sterns and low-pointed prows, and they sail splendidly, when rigged in the most approved style, and fitted with bamboo and mat sails of a superior make and texture. When caught in a breeze, the lofty sails bear them along at a tremendous pace. Many of these boats are decorated in a very costly manner, with elaborate carving and gilding.

The mat sails are generally preferred by Chinamen to those of any other material, because they hold a better wind, and may be kept flat and stiff. When first turned out from the maker's hands, these bamboo and mat sails really look very neat and pretty, particularly those made of the superior sort of matting.

Occasionally a sailing-boat may be seen with sails made of blue nankeen, but it is not generally liked, as it soon gets out of shape, and is not so durable as the mat material.

The sails and rigging of the pleasure-boats are fitted and controlled with ropes and cordage, in a similar manner to those of the Chinese fast-boats, already described.

Chinese Flower Boats.

'The barge she sat in, like a burnish'd throne,
Burn'd on the water. The poop was beaten gold;
Purple the sails, and so perfumed, that
The winds were love-sick with them. The oars were silver;
Which to the tune of flutes kept stroke, and made
The water, which they beat, to follow faster,
As amorous of their strokes.'

Shakspeare.

The Chinese flower boats, although the greatest ornaments to be seen on the rivers of that country, are nevertheless one of the greatest disgraces, being occupied by women of easy virtue, and frequented by the Chinese fast men and wealthy rakes of the city, who shape their course to them, under covered sampans, by the great highway of the river. When once aboard, they are secure from public supervision or intrusion, and there

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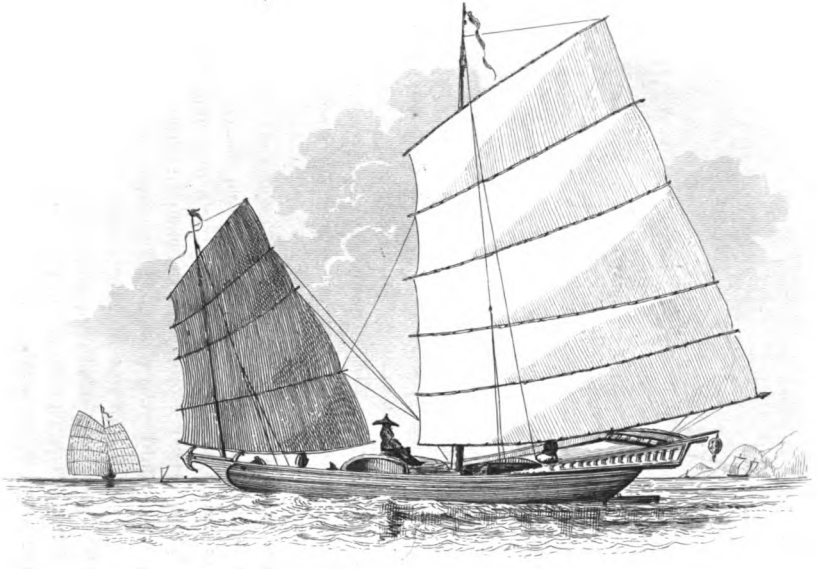

CHINESE PLEASURE BOAT.

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they are indulged with the luxuries of fragrant tobacco, opium, choice wines, and *liqueurs*—music, song, dance, and mirth all lending their aid to influence the imagination of the willing victims, and rendering them an easy prey to the wiles of the fascinating creatures who inhabit them.

But, independently of the purpose for which they are used, these fairy-like vessels, or floating boudoirs, are objects of great attraction to strangers, on entering the Chinese rivers. They are said to resemble large floating bird-cages, but in shape they are in some respects similar to the Clerk's boats, (1) or floating houses of the upper classes of the Chinese, but larger and more splendidly decorated. Some of them are ornamented with beautiful lattice-work, and are painted, carved, and gilded in a very costly manner. (2) On the roof, or top of the house, vases and pots of the gayest and most fragrant flowers, plants, and shrubs are arranged with exquisite taste; and round and about them are pretty balconies communicating by flights of steps with the beautifully-fitted interior.

At night, when lighted up with coloured lanterns, they are even more picturesque than by day—

> 'At the helm
> A seeming mermaid steers; the silken tackles
> Swell with the touches of those flower-soft hands,
> That yarely frame the office. From the barge
> A strange invisible perfume hits the sense
> Of the adjacent wharfs.' (3)

None but Chinese are admitted aboard these mysterious vessels. On several occasions, when Europeans have attempted to obtain admittance, they have been robbed and maltreated by the men aboard them. (4)

(1) See *infra*, page 229. (2) Fortune's 'China' (3rd ed.).

(3) Shakspeare.

(4) *Vide* Dr. Downing's 'Fan-qui.' Also Power's 'China.' Mr. Power says:—'Mr. Thom, late Consul at Ningpo, trusting to his knowledge of the language, attempted to gratify his curiosity, and introduced himself in a Chinese garb; but he was detected and captured. He was stripped, and carried on a pole through the suburbs of Canton, exposed to all the insults

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Mandarin Boats.

The Chinese mandarin boats are among the prettiest of all the river craft—very light, elegantly proportioned, fitted and ornamented with neat carving and fancy-work, and painted with exquisite taste—and the masts, sails, and rigging are quite in character with the hull; so that they are said to resemble 'a delicate insect upon the surface of the water.'

On board each of these boats a mandarin is stationed, with about sixty or seventy soldiers under his charge, who, with the mandarin, live aboard the boat; and their office is to cruise about the river, and seize all the smugglers they can catch, as well as those who commit offences against the laws. These boats are well provided with weapons of war, and have, besides, several small swivel-guns.

The manner in which they are usually painted is as follows:—The upper part, outside, bright blue, and all the lower part snowy white. In the blue strake are oval port-holes for the oars; the latter are white, and the interior of the port-holes red. Sometimes as many as thirty oars are employed on each side of the boat.

The mandarin boat is well decked with a brown hard wood, which is kept bright and polished. The crew squat on the deck, but the mandarin sits at the stern, on a handsome mat, and appears to spend the greater portion of his time in smoking.

A light and elegant wooden roof, of Gothic form, is supported, several feet above the deck, by tall round pillars at each of the four corners. The interior of the roof is painted and ornamented with good taste; and some of the mandarin pleasure-boats are lined with crimson silk, and the roof edged with gilded carving; the outside is also neatly painted, the edges being adorned with vermilion and gold-leaf, and fringed with scallops of prepared leather. The seats and couches are covered with blue and scarlet velvet.

of the crowd. The ill-usage he met with nearly cost him his life, and quite cured him of any desire to peer too closely into the ways of his neighbours.'

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During the hottest weather in summer, and the coldest in winter, the roof is covered with mats of paddy straw, neatly and regularly placed over the top, thereby giving it the appearance of a newly-thatched cottage roof.

The mandarin boat is fitted with two masts, and long tapering topmasts; ornamented with little flags, pennants, and golden balls.

The sails are made of a very fine sort of matting, neatly sewn together, 'and are somewhat of the shape of an acute-angled triangle.'

From the ensign staff at the stern hangs a beautiful white flag, marked in the centre with bright scarlet devices.

At the stern there is a rail, somewhat similar to the tail-board of a hay-cart, projecting upwards in a slanting direction from the deck; which not only lengthens the vessel, but also serves as a cool reclining place.

These gay-looking boats are exceedingly pretty objects on the Chinese waters; and, as they pass swiftly up and down the rivers, are much admired by strangers. (1)

Clerk's Boats.

These—with the exception of the Flower boats (2)—are the most ornamental of the Chinese boats. They are fair specimens of the floating houses of the upper classes of the Chinese people. 'They may be said to be genteel residences, the counterpart of which you would expect to find in a small retired street of London.' A good deal of taste is displayed about them in lattice-work, carving, and painting; the roof is ornamented with pots of choice flowers, and a coloured flag is hoisted at the stern. These boats are moved about with a pair of large oars, and sometimes a small sail is set above the roof of the building. (3)

(1) Downing's 'Fan-qui.' Power's 'Three Years Residence in China.'

(2) *Ante*, page 226.

(3) For a full and minute description of these remarkable floating residences, see the 'Fan-qui,' vol. i. p. 160.

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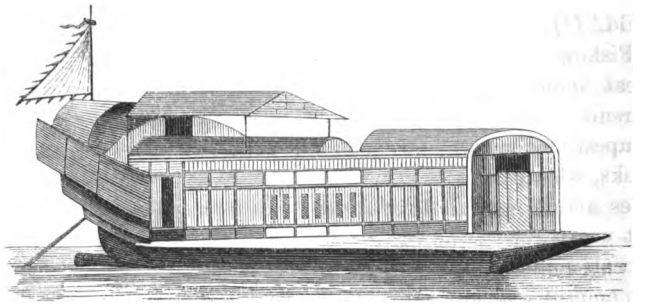

HOPPO'S BOAT.

The engraving above will more clearly illustrate the superior kind of house-boat used by the middle class of Chinese people.

The boats of the merchants of Hong-kong and the large flower boats, already mentioned, are very splendid.

They are, in fact, a kind of wooden house raised upon the floor of the boat, having the entrance near the bows, space being left there for the boatmen to stand and row. This entrance, being the front, is carved in a most superb style, forming a prelude to what may be seen within. Numerous lanterns hang from the roof of these splendid showy cabins; looking-glasses, pictures, and poetry adorn their sides; and all the peculiarities of this singular people may be discovered in these their floating palaces. (1)

FISHER-BOATS.

Some of these are remarkably fine and powerful boats, and, in point of form and sailing qualities, are infinitely superior to the junks and larger craft. It is usual for each fisher-boat, or pair of boats, to be the only house, home, and habitation of a whole family, who rely for support entirely on their exertions and success in fishing.

'Clumsy, slow, and ugly as are the junks and larger vessels, there is nowhere to be seen finer fishing boats, or

(1) See Fortune's 'China,' vol. i. p. 121 (3rd ed.).

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river craft better adapted for work, or of greater variety of build.' (1)

Fishing is a calling that is exercised by the Chinese with great industry, and on a scale almost unexampled. The pursuit is conducted not so much on the open sea, amid tempest and peril, but by numerous individuals in the lowest ranks, whose boats are their only abode, and who spend their lives and find their support upon the waters. (2) They do not venture very far upon dangerous seas, but pursue their avocations chiefly on the lakes, rivers, and sheltered bays of the empire—forming, as it were, a nation by themselves.

They are, however, often exposed to great risk; and after all their hardihood and enterprise, they have much difficulty in providing themselves with the actual necessaries of life, and most of those they do obtain is by barter.

Dragon-Boats. (3)

These are so called from their resemblance to dragons. The prow of a dragon-boat is in the form of a dragon's head and shoulders, and the stern resembles the tail. They are of a very long and narrow form; some of them are used for rowing, as well as sailing. For the latter purpose they are rigged with three masts and light sails, of finely-wrought bamboo; and the masts are ornamented with tassels of hair, silk flags, and long feathers. The prow, stern, and gunwales are also hung around with gold and silver fringe; and they are among the lightest, most beautiful, and gayest-looking of any of the Chinese boats.

The festival of Dragon-Boats is observed during the fifth moon, in honour of Kieuh-yuen, a virtuous statesman, who drowned himself during the dynasty of Chau (about 2,300 years since), to avoid the displeasure of his Sovereign. The festival lasts several days. The boats used on this occasion are very long, and some pull from eighty to one hundred oars. The festival is kept on all the rivers of the empire. After the

(1) Power's 'China.'
(2) Crawfurd and Murray's 'China.' Barrow's 'Travels.'
(3) Nieuhoff's 'China.' Du Halde's 'China.'

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races, the boats are buried in mud or sand (to prevent their becoming warped and spoiled), where they remain till the following year. This festival is principally kept up by the different public officers, who frequently stake considerable sums of money on their boats.(1)

Serpent-Boats, Snake-Boats, or Long-schons.(2)

These are very similar to the dragon boats, but are shaped so as to resemble a water-snake, and curiously painted in bright and gay colours. Some of them are one hundred feet in length, although only two feet wide; they are so narrow that there is only sufficient width for the crew to sit singly. As many as fifty or sixty individuals compose the crew of each boat, and, by means of paddles, appear to shoot over the water with great rapidity. A regular stroke of the paddles is maintained by keeping time to the beat of a gong, on which one of the crew performs.

Races with these boats take place every year at Canton and other large towns in China.

Centipedes, or Smug-Boats.

These are the boats of the Chinese smugglers. They are called centipedes from the great number of oars employed in calm weather, each of which is fastened to a bamboo thowl-pin; and so silently do they creep about at night, that they seem, as it were, to walk the waters with their oars, as if upon so many legs. They are also termed by the mandarins 'fast crabs' and 'scrambling dragons,'(3) terms by no means inappropriate, for it is seldom the mandarins are able to overtake them.(4) But these boats are not always propelled by oars; they are rigged with two masts, and mat sails, similar in shape to those of the mandarin boats, but of a coarser material.

(1) 'Chinese Repository,' vol. xx. p. 89 (1851).

(2) Downing's 'Fan-qui.' Du Halde's 'China.'

(3) A new class are called 'Muscle-shell boats' (*vide* 'Chinese Repository' vol. i. p. 159).

(4) Downing's 'Fan-qui.' Power's 'China,' &c.

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They are large, flat-looking, decked boats, with considerable breadth of beam, and very smooth bottoms; they have also high bulwarks, with weapons of war lashed inside; and all are provided with a house or covering, made of common bamboo-tiles and matting. They have high sterns, and a tail-board similar to a mandarin's boat; which, without the elegancies, they resemble. No bright-coloured paint is bestowed upon them; on the contrary, they present a shabby, brown-coloured appearance.

They are altogether strongly built, and, whether under sails or oars, are very fast. The fellows who man them are a desperate set; and as to mandarins, customs' officers, and others, they set them all at defiance. A small fleet of these boats has been known to frighten and drive off all the Government boats, and then attack and pillage Canton itself.'(1)

Duck Boats.

The duck boats must be ranked among the curiosities of Chinese craft. They are large flat-bottomed boats, with low sides, and a house erected upon them. They have a broad deck, or duck-walk, covered with lattice-work, extending the whole length of the vessel on each side of the covered parts.

The after, or best, part of the cabin or house is given up to the accommodation of the ducks; whilst the proprietor, with his wife and family, content themselves with a miserable apartment at the fore part. In the morning, at sunrise, the doors of these floating duckeries are thrown open, and the feathered occupants are then permitted to waddle round the premises at their pleasure.

Stepping-boards are also let down at the sides, or fore part of the boat, towards the water on one side, and towards the land on the other. Up and down these the ducks waddle to and fro, as inclination dictates, or their watchful owner directs. At roost time, they are called aboard the boat by a whistle, to the sound of which they are taught to return

(1) Power's 'China.'

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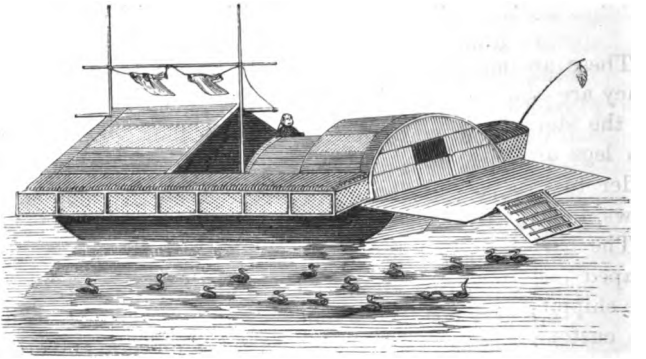

Duck Boat.

home; and when they are all on board, the stepping-boards are drawn up, and the birds are then made secure for the night.

Tankeä Boats.

The tankeä, or egg-house, boats are probably more numerous than those of any other class. They are generally not more than twelve or fifteen feet long, and about six broad—some of them much smaller. They are the oddest things of the kind ever seen, being flat-bottomed, wall-sided, and very shallow, the gunwale standing about six feet above the surface.

In the middle of the boat is a little house, or covered cabin, consisting merely of matting spread over half-hoops, or lattice-work, forming a sort of archway; the interior is also lined with matting.(1) They are kept very clean, and are each managed by two Chinese girls.

The author of the 'Fan-qui' says:—'As I stepped into this conveyance, they placed a stool for me in the middle, under the house, while they went, one to either end, and began to work stoutly at the sculls. Their dress was of blue nankeen, and one of them wore a hood; their hair was not shaved, but divided and plaited down the back, with a scarlet string interwoven near the end. They were good-natured, pretty-looking young women, and smiled frequently, exhibiting beautiful teeth.'

(1) 'Chinese Repository,' vol. i.

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Barbers' Boats.

These are among the very smallest of all Chinese boats. They are about eight or ten feet long, and just wide enough at the stern to admit the body of the Chinese barber, whilst his legs are stretched forward towards the bows; and, in order to trim the little craft, a large stone is placed in the bows, to keep the proper bearings.

The barber propels his little boat with a wooden paddle, shaped just like a spade, with which he moves swiftly among the shipping, digging his way, and attracting the attention of his customers by every now and then striking a flat piece of metal with a small steel instrument like a musical fork, with the notes of which all who have visited Chinese ports are familiar.

Dr. Downing, in the 'Fan-qui,' says of these curious little boats:—'In leaning over the side of the poop, on a clear fine day, protected from the burning heat of the sun by the awning spread above you, you will frequently hear a sound like that of a large grasshopper, or the striking of a musical fork, proceeding from the water. On looking about to discover the cause, you see a Chinaman, dressed in a blue frock, with one of the great umbrella-hats on his head, directly under your eye. This is the barber, in his boat, who, at the same time, turns up his head to see if he has attracted any customers.'

Wash Boats.

These remarkable boats, which are in great numbers at Whampoa and other places, are each under the control and occupation of three or four Chinese girls, who scarcely ever leave them to go ashore throughout the whole year, unless to attend the ghosh-house. They are about twenty feet in length, and of proportionate breadth, with square or cropped ends, and flat bottoms. They are managed by two oars, one at the side and one at the stern; the inside of the boat is decked, or covered over with boards, many of which are removable at pleasure, so as to form extensive cupboards between the deck and flat bottom of the boat. In addition to the deck, there is

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also a house or roof, raised above the gunwales, and supported by wooden pillars. The roof or covering is composed of a rough kind of matting, formed of thin pieces of bamboo, woven together and arched, and supported on ribs of stiffer portions of the bamboo. Two or three of these coverings are placed upon the framework, one portion overlapping the other, and the whole forming a very good protection from the sun and weather. During cold or wet weather, the interior of this remarkable domicile is hung with a lining of rough cloth; and every night, or whenever the inmates seek privacy, the open front of the house is closed with a curtain of matting or cloth. The interior is also provided with a square of matting and a wooden pillow for each inmate. The author of the 'Fan-qui' says: 'The meanest beggar in England would shrink from being confined to such a place, yet these girls seem not only content, but even cheerful and happy; their red, good-natured faces are to be seen peeping out of the matting, and always with a smile or a laugh at your service.'

They apparently get their living by washing clothes for the sailors and petty-officers of ships; they also undertake needle-work and mending for any of the crew, always remaining with their boat fast to the ship until the articles are returned.

Chinese Canal Boats.

When the wind is foul, these boats are propelled by a class of men called 'trackers,' who, for a trifling remuneration, are compelled by poverty to perform the part which horses act in other countries—that of towing a vessel ahead by means of a rope, which is laid across the shoulders of the men. These trackers are often subject to great hardships and severe ill-usage. The work they have to perform is very laborious; besides which, they are frequently obliged to wade across small rivulets and delfs of mud, whilst towing the vessels against a rapid current and foul wind. A petty-officer attends them with a long lash, which is often used with brutal cruelty on the backs of the poor helpless trackers, should they tire or flag in their arduous labour.

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Sampans, or Sanpans.

The sampan is a small boat, without a keel; it is used in various occupations in all parts of the Chinese rivers and bays, and is in great variety as regards size. Some of the pleasure-sampans are of superior form; the fishing sampan is the largest. Those used for general purposes, as ferry-boats, pilot-boats, egg-boats, fruit-boats, &c., are smaller, and these are seldom sailed. The fishing sampans are rigged with one, two, and three masts, the smallest being always placed in the bows; the sail is usually of square or lug-like shape.

Children of both sexes are taught the management of the sampan as soon as their strength enables them to pull an oar, hoist a sail, or trim a sheet; and it is no uncommon thing to see a female tugging at the oar with an infant tied to her back, or a fishing sampan sailed and navigated entirely by a crew of females.

Boats of the Kweikong.

The boats of the Kweikong, or Cassia River, in China, are of a totally different form and construction to those seen at Canton. They have flat bottoms, and curve up high at the bow and stern, that the helmsman and the man on look-out forward may be placed in elevated positions, so as to see some distance ahead, and avoid the rocks in the course of their navigation of the boat down the river with the rapid current.(1)

The Cassia River abounds in rapids and shallows, so that, on ascending it, the crew have constantly to be dragging the boat over obstructions, notwithstanding that it draws only about five or six inches of water.

(1) See 'Sketch of a Journey from Canton to Hankow,' by Albert S. Bickmore, 1868.

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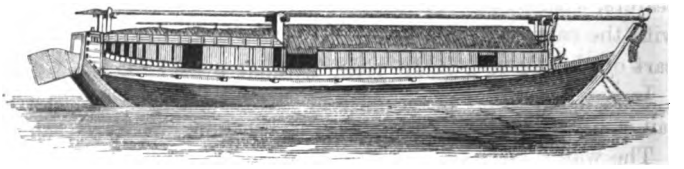

Japanese Cargo-Boat.

JAPANESE BOATS.

THE sailing-vessels of Japan are curious and different in some respects to those of any other nation. First among their peculiarities is the high stem-post, which peers above the deck, and higher than the level of the roof of the cabin, or rather range of cabins, which extend nearly from end to end over the whole vessel. The form of the hull is tapering from the middle towards the stem. The stern is the most peculiar part about them, being broad and flat, and provided with a wide opening, extending in some boats more than half-way down to the water's edge, and laying open to view the inside of the vessel. It is supposed that this opening was originally intended for the management of the rudder, but was afterwards forced upon the people by a penal law of the State. (1) But whether or not this law be still in force, it is a fact that the aperture at the stern remains in most Japanese vessels, and is used to considerable advantage for the landing of goods, and as a means of access for the crew to and from the vessel—the rudder being unshipped and employed as a bridge over the space between the wharf and the vessel. When lying in port, the rudder is triced up, in the manner represented in the engraving.

The mast is stepped abaft the middle of the vessel, and in a slightly aft-raking position. It depends for security almost entirely on a powerful stay, and is fitted so as to be raised and lowered with pulleys: when lowered, it is stowed away above the cabin roof, on bearers provided for the purpose, as shown in the engraving.

The deck consists simply of deal boards, laid loosely over the

(1) Kaempfer's 'History of Japan,' translated by Scheuchzer, 1727. Belcher's 'Voyages.'

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bearers, without any fastening; but it is almost entirely covered with the cabin, which stands nearly six feet high. The fore part of the deck is clear, for the anchor and tackle.

In wet weather, and at night, the mast is lowered, and the sail is spread over it, from end to end, as a shelter.

The watermen's benches, for rowing, are towards the stern. The stem is usually adorned with a knot of fringes, black strings, or hair.

In the common mode of rigging, parts of the sails are made to lace and unlace, so that they are reduced, instead of being reefed, by unlacing and removing some of the lower strips of canvas.

Captain Belcher, in his 'Voyages,' speaks of the smaller boats he met with, off Nangasaki, having a sail which appeared to traverse by rings on the yard, and to be divisible into four parts by unlacing them.

In the larger vessels the sails are divided into many parts in this manner; and, as the outer cords are securely attached to their bolt-ropes, the middle cloths must be those that are removed by reefing.

Captain Belcher says the Japanese vessels are not wanting in sailing qualities, if properly fitted with light spars and canvas, but they are crippled by the enormous mast that is put into them.

The pleasure-boats of Japan are a very numerous class, exhibiting a variety almost equal to those of China. The size, shape, and finish of these boats depend on the taste, wealth, and dignity of the owners. They are, however, generally contrived for rowing rather than sailing.

The class of large boats have upper and lower decks and cabins. The upper one is the principal, being of lofty dimensions, with handsome decorations, windows, and folding screens, and so divided into several partitions; the under cabin is low, and is the one used by the crew.

The prow of the principal boats is generally ornamented with a tassel of long black strings; and when persons of distinction are on their voyages, the cabin is hung about with cloths, on which their armorial bearings are embroidered.

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Japanese Fishing Boat.

Japanese boats are kept scrupulously clean, though unpainted, and they are generally gaily decorated with flags of various shades and colours; even the coast-guard boats are so adorned. The crews of the latter are usually all dressed alike; and the boats are propelled with sculls, which they use as oars, the rowers keeping time to a monotonous song.

Japanese Fishing Boats.

The fishing boats of Japan are also curious, though very well built. They have sharp bows, a large projecting stem-piece, or cut-water, in shape like the blade of a large knife, very broad open sterns, and immense rudder, which hangs below the keel or bottom of the vessel, and can be shipped and unshipped at pleasure. The rudder is placed in a cramped position, and can only be turned to a limited extent on either side. These boats have flat upper sides, and flat bottoms, but rounded lower sides, and broad sterns.

The mast is a lofty one, and, as in other vessels of Japan, is stepped, not in the fore part of the boat, but in the aft part, about a third or more from the stern. The thwarts are fitted across the boat, resting upon the top of the gunwales; the ends of the thwarts project beyond the sides, and a thowl-pin is fixed upon and near the extremities. The oars they employ are peculiar, being composed of two separate pieces—one a long straight blade, of the same width throughout; the other, the handle, which is about two or three feet in length, and bends or inclines inwards, for the apparent purpose of obtaining extra leverage in rowing.

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Japanese Passage-Boats.

These boats have a similar kind of stem-piece, or cut-water, to that of the fishing boats above described. They have, besides, a prettily-formed wooden canopy, erected on four small pillars, and extending over the fore and centre parts of the boat.

The stern of the Japanese passage-boat is open, like the other vessels, but it is steered with an oar, as it has no rudder.

There are good models of Japanese fishing and passage-boats of the class above described in the United Service Museum.

The sails of Japanese boats are very singular, and somewhat picturesque, consisting generally of three stripes of sail-cloth or matting, united by a kind of lace-work, and thus forming one whole sail. It has a very pretty effect, and the connected parts can be unlaced, and so one or more taken in when necessary.(1)

The Japanese junks, though strange looking vessels, are by no means so heavy as those of the Chinese.

Their plain wooden sides, with the exception of a narrow band of black or red, about half-way down, are entirely innocent of paint.(2)

BOATS OF THE INDIAN ARCHIPELAGO.

The boats of the islands of the Indian or Oriental Archipelago are a very remarkable and numerous class, varying in size from the smallest canoe hollowed out of the trunk of a tree, for the navigation of small rivers, to vessels of the burthen of forty and fifty tons, which navigate the archipelago from one extremity to the other.

Many of these vessels are ingeniously contrived, particu-

(1) 'A Lady's Visit to Manilla and Japan,' by Anna D'A. (1863).
(2) Ibid. p. 223.

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larly the sailing-vessels, some of which possess the most striking peculiarities—those of each island, or group of islands, having generally some distinct feature or variety, either in form or rig, and sometimes in both. But the most remarkable circumstances with regard to the building of these outlandish boats and vessels are, that in some parts, the native islanders construct them with the most homely and indifferent kinds of tools, sometimes without a single iron or metal instrument of any kind, but entirely with those of their own contrivance, made of flints, bones, and shells, and without any nails or metal fastenings of any sort; and yet with such primitive tools they display extraordinary skill, labour, and ingenuity, the several peculiarities of which will form the subject of description and explanation in the following pages under this head.

The smaller class of vessels are usually safe and swift, the larger ones more or less dangerous — the failure of the naval architect being proportionate to the magnitude of his attempts.(1)

Flying Proas of the Ladrone Islands.

The flying proas of the Ladrone Islands are among the swiftest and most extraordinary sailing-boats in the world. Through ages past they have been the only vessels used by the natives.

The invention of the flying proa is one which would do honour to the most educated and ingenious of mankind, and yet it appears to have originated entirely with an unlettered people, the inhabitants of a few small, outlandish, and remote islands; and the natives are no less dexterous in the management of the proa than in the building of it.

The flying proa is admirably adapted to the peculiar navigation of the Ladrones, lying as they do, all of them, nearly under the same meridian, and within the limits of the trade-winds; and therefore vessels employed in the navigation of

(1) 'History of the Indian Archipelago,' by John Crawfurd, F.R.S. (1820).

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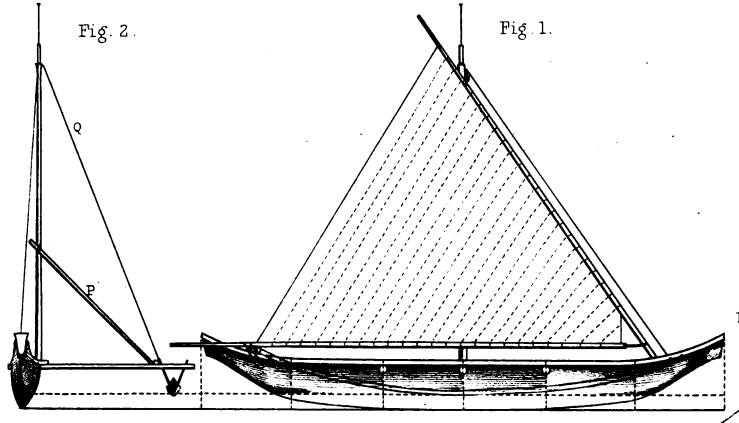

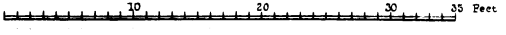

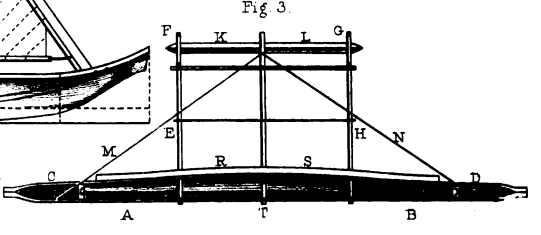

FLYING PROA.

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these islands, and in passing from one to the other, require to be especially and peculiarly well fitted for sailing with a side wind; and when we examine the uncommon simplicity and ingenuity of the construction and contrivance of the flying proa, and consider the extraordinary speed at which it sails, we shall in each of these particulars 'find it worthy of our admiration, and meriting a place amongst the mechanical productions of civilised nations where arts and sciences have most eminently flourished.' (1)

Explanation of the Plate.

Fig. 1 represents the proa with her sail set, as she appears when viewed from the leeward.

Fig. 2 is a view of the proa from the head (or stem on), with the outrigger to windward.

Fig. 3 is a plan of the whole, where A B is the lee side of the proa; C D the windward side; E F G H the outrigger, or frame, laid out to windward; K L the boat at the end of it; M N two braces from the head and stern, to steady the frame; R S a thin plank placed to windward, to prevent the proa from shipping water, and for a seat for the man who bales out the water; and sometimes goods are placed on it. T is the part of the middle outrigger on which the mast is fixed. The mast itself is supported (fig. 2) by the shore P, and by the shroud Q, and by two stays, one of which may be seen in figs. 1 and 2; the other is hid by the sail.

The flying proa, besides being an object of curiosity, may well furnish both the shipwright and sailing-master with wrinkles of no mean or contemptible character. The Rev. Richard Walter, M.A., (2) observes, with reference to the swiftness with which these proas sail: 'From some rude estimations made by our people of the velocity with which they crossed the horizon at a distance, when we lay at Tinian, I cannot help believing that, with a brisk trade-wind, they will run near twenty miles an hour.'

(1) Lord Anson's 'Voyage Round the World.'

(2) The Chaplain of His Majesty's Ship 'Centurion,' in Lord Anson's expedition.

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The form and construction of the flying proa is in direct opposition to the principles of boat-building as adopted in England, and, indeed, in almost every other country in the world. For, as the rest of the world make the two sides of the vessel as exactly alike as possible, those of the flying proa are totally different, one side being round, or bilge-shaped, whilst the other is flat and perpendicular as a wall; but the head and stern of the proa are as exactly alike as possible, and the vessel may be sailed with either end foremost, but always with the rounded side to windward, and the flat one to leeward; therefore, on the return voyage, the *boat* is not turned round, but the *sail*. Indeed, the boat never need be turned round but twice a year, and that only when the trade-winds shift, which they do once a year only, blowing six months in one direction, and six in the opposite.

Being, therefore, always enabled to know for a certainty the quarter from whence the wind will blow, and that wind being always a side one throughout the whole range of the Ladrones, the islanders are enabled to turn such knowledge to useful advantage; and so they find it unnecessary that their boats should possess the power of tacking and working to windward, or of sailing before the wind, but exclusively that of reaching, or sailing with a side wind. Therefore the Ladrone inventor places a very large sail on a very narrow form of hull—indeed, such a sail as would inevitably upset the proa in a breeze, unless it were counterpoised against the force of the wind by some artificial contrivance.

It has been already stated that the lee side of the proa is flat, or, in other words, the shape of the hull is something like one-half of a boat severed longitudinally, and then the whole open side boarded up from stem to stern with straight planking; all which materially contributes to render it the more ticklish, and easy to capsize. But in order to prevent such a catastrophe, the proa is fitted with an outrigger, which forms a most important feature in the boat, and one of its greatest peculiarities.

The outrigger consists of a frame made of bamboo poles, affixed to the proa, and standing out to windward. At the ex-

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treme end of the frame is fastened a log of wood, slightly hollowed, and fashioned into the shape of a small boat. The weight of the frame and log is intended to counterpoise the proa against the force of the wind acting upon the sail, and to prevent the proa from being capsized.

The hull of the proa is very neatly made and put together. The bottom is of one piece, made like the bottom of a little canoe, very neatly dug, and left of a good substance. This bottom part is instead of a keel, twenty-six or twenty-eight feet long. The under part of the bottom is made round, but inclining to a wedge, and smooth, and the upper part is almost flat, having a very gentle hollow, and is about a foot broad. From this bottom, or keel, both sides of the boat are carried up to about five feet high, with narrow planking, not above four or five inches broad, and each end of the proa turns up very prettily.

The breadth of the proa depends in a measure upon the length; but it seldom exceeds four or five feet amidships, and is much less at the ends.

The mast, it should be observed, although placed amidships longitudinally, is not so latitudinally, but stands in the bilge of the proa, close to the weather-gunwale, and is fixed to the middle beam or bamboo of the outrigger.

The sail is triangular, or latine-shaped, but much wider at the foot, and less lofty than the latines of other nations; and although it looks not a large sail in the proa, still, when it is considered how long and narrow the hull of the proa is, it will be found to be an enormous sail, in proportion to the stability of the boat, when viewed independently of the outrigger.

The fore end of the yard is secured in a socket made purposely to receive it at each end of the proa. The sail is also fitted with a boom, so that it stands nearly as flat as a board; and the boom is also used for furling the sail, and rolling up a portion of it when the wind is heavy, and such is the mode of reefing the sail of the proa.

The sail is made of matting stuff, and the mast, yard, boom, and outrigger are all of bamboo.

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When the proa alters her tack for the return voyage, her crew bear her away a little to bring her stern up to the wind; then, by easing the halyard, raising the yard, and carrying the heel of it along the lee side of the proa, they transfix it in the opposite socket, whilst the boom, at the same time, by easing off one part of the sheet, and hauling on the other, shifts into the contrary or required position, when that which was the stern then becomes the head, and the proa is trimmed on the other tack.

The proa generally carries a crew of six or seven, two of whom are stationed, one at the head and another at the stern. These steer the vessel alternately, with a paddle, according to the tack on which she goes. The duties of the others are to bale out the water when she leaks or accidentally ships any, and to trim, adjust, and attend to the sails.

From the description given of these extraordinary vessels, it will be seen how admirably they are adapted for ranging the Ladrone Islands; and from the great power they possess in the very large sail, the flatness of their lee-side, and their narrow form of hull, assisted by the outrigger, they are enabled to fore-reach with immense power, and without any apparent lee-way. (1)

Vessels bearing some resemblance to the flying proa are often met with in various parts of the East Indies, but none of them appear to have any pretensions equal to those of the Ladrone Islanders, either in the ingenuity of form and construction, or in the speed at which they sail. Voyagers have, therefore, asserted their belief that the flying proa was the original invention of some genius of the Ladrones, and was afterwards imperfectly copied by neighbouring nations.

It is mentioned by Pliny, eighteen hundred years ago, that vessels navigating the seas to the west of Taprobane (Ceylon) had prows at either end, to avoid the necessity of

(1) The engraving at page 243, and explanation above given, have been taken from a description of one of these remarkable vessels which fell into the hands of the crew of His Majesty's Ship 'Centurion,' when on an expedition to the South Seas, under the command of Lord Anson, in the year 1744.

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tacking. (1) And the same fact is also mentioned by Strabo, who says they were built with prows at each end, but without holds or keels. (2) Still, this mention by Pliny and Strabo does not appear to clash with the general impression of the early voyagers, that the original notion was derived from the Ladrone Islanders.

The peculiar mode of counterpoising the canoe, when the pressure of the wind acts forcibly on the sail, is also a very primitive notion.

Even at the present day, with all our boasted improvements in marine architecture, it may be fairly questioned whether the flying proa is not incomparable as a vessel for swift sailing, close to the wind. And what other vessel makes so little leeway? Besides, too, the flatness of the sail, combined with the flat lee-side of the vessel, would seem to be the most scientific combination of weatherly qualities ever invented. (3)

A modern attempt at the art of constructing a flying proa, to sail in English waters, was made in the year 1860, by a member of the Royal Mersey Yacht Club, who, assisted by the ingenuity of an able mechanic and boat-builder on the Mersey, appears to have been highly successful in turning out a veritable flying proa; which was, of course, one of the greatest attractions and most extraordinary novelties ever seen on that

(1) 'Ob id navibus utrinque proræ ne per angustias alvei circumagi sit necesse' (Pliny, *Hist. Nat.* vi. 24).

(2) Strabo, lib. xv. c. 15.

(3) In Pigafetta's 'Voyage round the World,' A.D. 1519 to 1522, the flying proa is thus described:—'The chief amusement of the Ladrone Islanders consists in sailing about with their wives, in canoes similar to the gondolas of Fusine, near Venice, but they are still more narrow; all of them are painted either black, white, or red. The sail is made of the leaves of the palm-tree sewed together, and has the shape of a latine sail. It is always placed on one side; and on the opposite side, to form an equipoise to the sail, they fasten a large wooden log, pointed at one end, with poles laid across and fixed in it, which keeps the boat steady, and admits of their sailing without apprehension; their rudder resembles a baker's shovel—that is to say, it consists of a pole fastened into a plank. They make no difference between head and stern, as they have a rudder at each end. They are excellent swimmers, and have as little fear of the sea as dolphins.'

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river. This Anglo-Ladrone proa was described as being 'highly scientific, and solving many problems in the science of marine architecture. She is diametrically the opposite, in every particular, to all European vessels. She has much greater length, in proportion to her beam, than any other vessel whatever. Her two ends are exactly alike, turning up prettily in the prow-like manner of the ancient galley, ending in a handsomely carved scroll. The most surprising feature is, that one of her sides is flat, acting as a lee-board, and it is on this side that she always sails when by the wind. The other side, which is the windward one, is moulded, rounding in the manner of other vessels. Her bottom, or midship section, is of a rounded, wedge-like form, and has great length of floor. On this side there is a strong frame-work, or outrigger, firmly built to the vessel; and at the end, parallel with the keel, a log of wood, shaped into the form of a small boat, is strongly attached, made hollow and decked over. By this arrangement she is kept from over-setting, it acting also as her ballast, and giving the required stability. This quality can be increased *ad libitum*. It also acts antagonistically to the pressure of the wind on her sail when by the wind: as the pressure increases, so does she gain stability, by gradually feeling the whole weight of the log boat, as it is lifted out of the water. She only draws about fifteen inches of water; yet the flatness of her lee side, and its clear run, prevents deflection from her course when on the wind. Her mast is placed exactly in the middle of her length, perpendicularly, but stepped on one side, and can be lowered on deck at pleasure. She has one sail, which, in its principle and working, is as surprising and as novel as the boat herself. It will turn round to any point of the compass, and, working on a centre, it can be so adjusted as to act as a steering sail, as well as a most powerful means of propulsion. She can be run upon any rhomb-line of the compass, in a direct course, merely by varying the angle of the sail. It can be reefed to any degree required to meet the power of the wind, and yet retain its original shape; this

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is effected by the simple and perfect process of rolling it up at the foot on the lower yard. The general simplicity of the construction of the proa, and ingenuity of contrivance in her sail and tackle, is beyond that of any other vessel; one mast, one sail, one shroud, three blocks, one halyard, two sheets and braces, comprise all her tackle. The seamanship, or manner of sailing her, too, is not the least part of the novelty. Two hands, in moderate weather—one sitting at each end—have perfect command over the vessel; and she is steered by them alternately, with a broad paddle, according to the tack she is upon. She sails either end foremost, that which was her bow becoming her stern, and *vice versâ*. She is never 'put about;' but when required to go on the opposite tack, the steersman merely 'keeps her away,' until her sail fills at the opposite end; that which was the fore-leech becomes the aft-leech, and the end of the yard is passed under a notch to keep down the tack of the sail. Thus all the confusion of tacking is done away with. In case of a sudden squall, a single halyard let go brings down the sail on deck immediately, and the danger of the gaff-sail and its complexity is avoided; nor is there any jybing, and its hazardous consequences, to encounter. Combined with all these desirable properties, from the fact of the vessel requiring no ballast whatever beyond her stores, she is as buoyant as a cork; and being constructed throughout of wood, she can never founder, and is a life-boat in principle. Her prow at each end rising boldly up, with curved lines, enables her to rise to the sea, and her length of floor and general buoyancy prevents any of those sudden and heavy plunges which take place with vessels loaded with lead or iron ballast and heavy spars. She will rise with the utmost promptitude on the top of the wave, or, in scudding before the sea, go over it, from her superior lightness. Swimming on an even keel, and drawing so little water, she can run over banks and get into shallows, or make harbour, when other vessels are compelled to keep at sea or wait a tide. We have said nothing of her velocity, or capability of passing through the water; yet this is her

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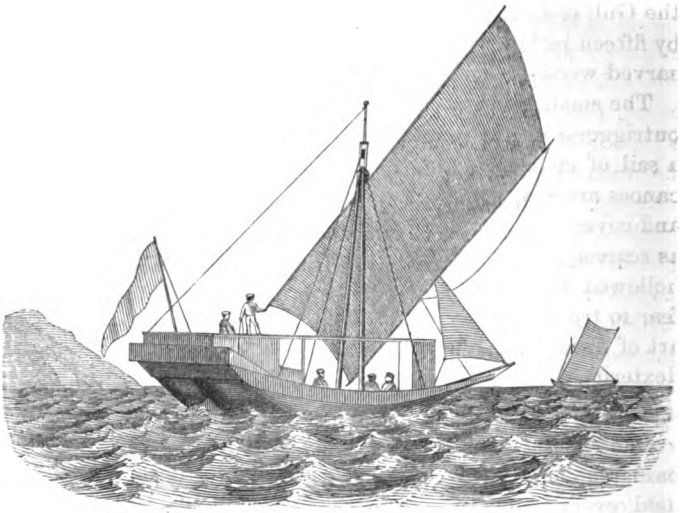

Sailing-Boat of Borneo and Celebes.

most surprising quality. From the general curvature of her bottom, and bold flanging stems, she can be propelled through the water with a speed which would send any other sailing-vessel bows under. From this description, it will be very evident to the scientific reader that her capability of speed is something very considerable. We shall conclude with the statement that she carries *three times* more canvas, according to the resistance of the vertical midship section immersed, than the fleetest of our yachts.'(1)

Boats of Borneo.

Some of the boats of Borneo and Celebes are exceedingly well made. The sailing-boats have high and very broad sterns and long raking bows. They have a double or shear-mast, and long-shaped square-sail; they have also a stage or gallery, and other peculiarities, which will be better understood by reference to the above engraving.

(1) *Vide* 'Bell's Life' for June 1860.

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Some of the canoes which Captain Mundy (1) met with in the Gulf of Boni he describes as of very long shape, propelled by fifteen paddles, and ornamented both at prow and stern with carved wood.

The small sailing-boats he describes as fitted with wooden outriggers, which, weighted with men, enabled them to carry a sail of enormous size. On the inland rivers, some of the canoes are forty or fifty feet long, by only two and a half wide, and covered with a small kajang or mat. Others are so small as scarcely to float a child of five years of age—in fact, but a hollowed log. But it appears that the native mothers do not fear to trust their children upon them, who soon acquire the art of swimming, and, in the course of time, with remarkable dexterity. (2)

Boats of Bruni.

One of the greatest novelties at Bruni is the floating-bazaar. There being no shops in the city, the market is held every day in covered canoes. These are moored in tiers, forming lanes on the river, up which the purchasers ply in paddling canoes, look on, and make their purchases.

The trading boats come in every morning, at sunrise, from all parts of the river, laden with fresh fruit, and every other commodity produced in the vicinity. (3)

The floating market is thus alluded to by Mr. Spencer St. John, in his interesting work on Borneo :—

'Several hundred canoes, each containing one or two women, covered over with mat hats a yard in diameter, floated up and down about the town, pulling through the water lanes, and resting for a while in the slack at the back of the houses.'

Proas (or Prahus) of Borneo.

The proas—praus or prahus (4)—of Borneo are swift-sailing vessels, though made of the trunk of a tree, hollowed, and

(1) 'Borneo and Celebes,' by Captain Mundy, R.N. (1848).

(2) 'Life in the Forests of the Far East,' by Spencer St. John, F.R.G.S., &c. (1862).

(3) 'Borneo and the Indian Archipelago,' by F. S. Marryat (1848).

(4) Different voyagers and authors appear to spell this word in different ways, but 'proa' seems to be the most general.

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sharpened at both ends; they have neither keel nor rudder, but are steered over the quarter with a very long paddle, thirty feet in length, and about twelve or fourteen inches wide in the blade. The thwarts or seats are placed across the boat, above the gunwale. As a precaution against the danger of capsizing under sail, these boats are fitted with outlagers—a framework consisting of two long poles, which are run out on each side, one across the fore part, and one across the aft part of the proa, the outer ends of the poles being run into, or lashed to, a large bamboo. When the wind is heavy, part of the crew run out on the windward outlager, to keep the boat upright. These proas are fitted and sailed with a large latine-shaped sail, made of matting. (1)

Baju and Balignini Pirate Prahus.

The Balignini, which are of the Bajow or sea-gipsy tribe, have large prahus, with crews of seventy or eighty men, who sometimes row double-banked; and to each prahu a long and fleet small boat is attached, which will hold from ten to fifteen men.

They seldom carry large guns, like the Illanans, but lelahs (small brass guns); also swords, spears, stones, and other instruments of attack.

The Balignini and Baju pirates were formerly the terror of the Indian Isles. Mengkabong is the head-quarters of these lawless people.

The Baju prahus are rigged with tripod-masts, which consist of three tall bamboos, the two foremost being fitted on a cross-beam, the other loose; so that, when a heavy squall threatens, the masts can be immediately struck. (2)

The arrangement of the tripod-mast fitted to the Tartar galley (and described at page 255) is somewhat different to that of the Baju boats, the *fore-leg* of the mast being the one by which the tripod of the Tartar galley can be struck; whereas the aft-leg in the Baju prahu is the loose one.

(1) 'Voyage to and from the Island of Borneo,' by Captain Daniel Beeckman, A.D. 1718.

(2) Spencer St. John's 'Borneo.'

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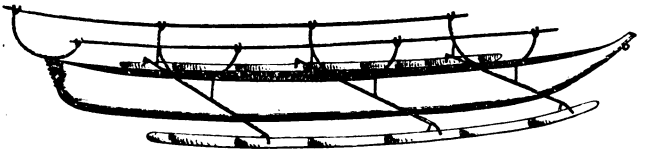
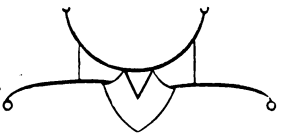


Canoe of the Sooloo Islands.

The canoes of the Sooloo (or Sulu) Archipelago are curiously and ingeniously contrived. They differ from those of the other islands, not only in shape, but also in the outrigger. A Sulu canoe is made of a single log of wood or a tree, but it is seldom large enough to carry more than two persons at a time. The outrigger is a double one, i.e. it extends on both sides of the canoe, so as to give it extra stability. A railing is also placed above the sides of the canoe, with supports, which rest upon the bearers of the outrigger.



Section of Sulu Canoe.

These canoes are propelled by means of a doubled-bladed paddle or sweep, with which they may be managed entirely by one person. Small canoes of this kind are never sailed. They are sometimes built upon and enlarged with boards or upper sides, which are secured to the trunk. (1)

The Sulu or Illanan Prahus.

'Woe to the craft, however fleet,
These sea-hawks in their course shall meet!

. . . .

For not more sure, when owlets flee
O'er the dark crags of Pendelee,
Doth the night-falcon mark his prey,
Or pounce on it more fleet than they.'

T. Moore.

The Sulu or Illanan prahus are the largest kind of prahus in the Indian Archipelago; they belong to the pirates of the Sulu

(1) See Wilkes' 'United States Exploring Expedition,' vol. v. p. 332.

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Isles, who go under the name of Lanans. These prahus are from twenty to thirty tons burthen, nearly a hundred feet in length, and of considerable breadth of beam, with a sharp hollow bow; the lower part of the hull is strongly built of timber; but the bulwarks, decks, and internal fittings are chiefly of bamboo, ingeniously fastened together. The crew is generally a very numerous one, sometimes from forty to fifty. A raised platform is constructed on both sides of the prahu, for the convenience of the pirates in their lawless pursuits, and as a fighting-stage. These boats are propelled both by sails and oars; sometimes fifty oars are used at once. They draw but little water, are fast under sail, and well adapted for navigating the dangerous seas of the archipelago. They are rigged with two separate shear-masts, each consisting of two spars lashed together at the top. The heels of the foremost are set in a base, which partly revolves, and the shear-mast can be also raised and lowered at pleasure; so that, when attacking a vessel, the sail can be let down, and the shear-mast directed in such a manner as to fall on the side or bulwarks of the attacked vessel; it then forms a ladder for the pirates to climb from the prahus to the deck of the vessel. The shear-mast can also be dropped on the bank of a river, so as to form a bridge; and it may be used for scaling walls, and other marauding practices. The sails of these prahus are made of matting and bamboo canes, and are of very large size; they also generally carry a square red flag at their foremast-head, and assemble in a numerous fleet when on their piratical adventures.

The Sulu are said to be the boldest and most cold-blooded pirates in the archipelago. They infest the straits of Macassar, the sea of Celebes, and the Sulu Sea.

Tartar Galley.

(*See Engraving.*)

The vessel used by Capt. Forrest in his voyage along the coast of New Guinea, was called a Tartar galley, but was, in fact, a Sulu boat, about ten tons burthen. This boat had a

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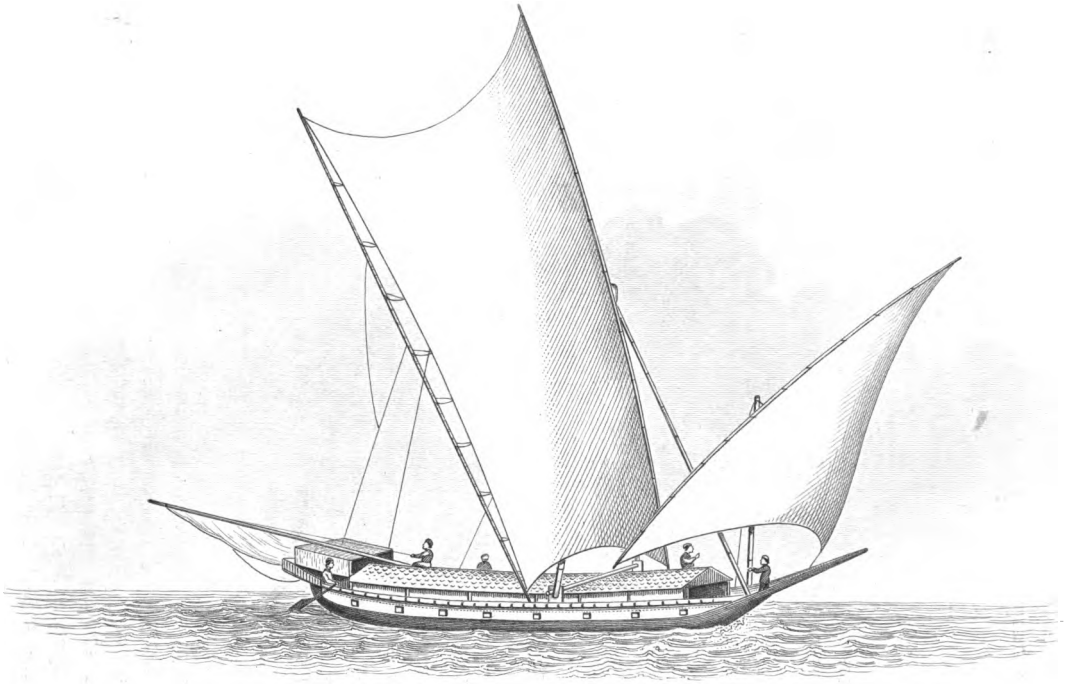

TARTAR GALLEY.

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kind of gallery built on each side, from stem to stern, projecting about thirty inches over each gunwale, upon which the rowers sat, sometimes twenty in number.

Although the Tartar galley was but twenty-five feet long on the keel, she overhung so much forward and abaft that her length, over all, was forty feet, and her draught of water about three and a half feet.

This boat had a tripod-mast, made of three stout bamboos. The feet of the two which stood abreast were bored at the lower end, across, with holes about three inches in diameter; and these two holes received the two ends of a piece of timber, which, like a main-shaft, was placed across the boat from side to side; on these the two spars turned, as on a hinge.

The fore-spar of the tripod-mast was fixed forward to a knee amidships, with a forelock, by unlocking which the mast could be struck with ease by three men. (1)

The mainsail was a large four-cornered one, called by the Malays *lyre tanjong* (pointed sail). The boat also carried a fore-mast, on which a latine sail was set; also a mizzen-mast, on which another latine could be used. When the wind was heavy, the lyre tanjong (2) was lowered, and a smaller sail (a latine) was set, and the vessel then resembled the rig of the Mediterranean galleys.

The advantages of the lyre tanjong appear to be that it is a very powerful sail in a breeze, and may be quickly reduced or reefed by luffing into the wind, easing off the sheet, and then rolling or winding up the sail, by the simple means of turning the winch or cross-bar that is fixed to the inner end of the boom. (3) By this contrivance the sail may be entirely rolled up, so that the boom and yard meet, and lay side by side together (as in the engraving of the paduakan, on the next page), and so furled. In the same manner, by turning

(1) Captain Forrest's 'Voyages' (1792).

(2) Captain Forrest suggests, that if two London wherries were lashed together, and the double vessel thus formed were fitted with the lyre tanjong, it would beat fast sailing-boats at least three to two.

(3) The kolay, Malay jellore, and other boats, are also reefed in the same manner.

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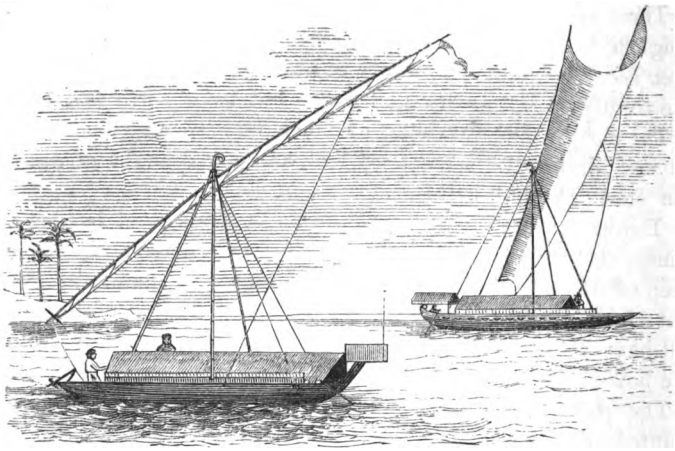

Paduakans of Celebes.

the winch the other way, the sail may be unfurled, and as quickly set, or half set, according to the weather.

The cabin, or covered part of the Tartar galley, was thatched with the leaves of a palm-tree, called *nipa*, being the same material as that used by the natives for covering their houses on the south-west coast of Sumatra, and in most of the Malay countries. The small apartment abaft was covered with boards, and was called by the Malays *koran*.

The Molucca proas and vessels of burthen are all fitted with the tripod-mast and lyre tanjong.

Paduakans of Celebes.

These singular boats of the island of Celebes are called 'Bugis paduakans.' (1) They are built at Bera, at which place were formerly the chief building-yards of the Macassars. The paduakans are remarkably well built boats. They are made very tight by the system of dowelling the planks together, as coopers do the parts which form the head of a cask; and they put the bark of a certain tree between the planks, in the place of oakum, which swells and fills them tight.

(1) Forrest's 'Voyage to Mergui.'

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Their system of boat-building is the very reverse of the English, inasmuch as they put the planks together first, and then secure them to the timbers (or ribs); whereas we set up the timbers first, and then secure the planks to them.

The natives adhere to their old models, and seldom venture on new designs. The bow of these vessels is lower than the stern, and in that respect they are rather unsightly to European eyes; besides, too, when under sail in rough winds, the bow is often driven under water. In order to keep off the spray at the bows, a bulk-head is raised a few feet abaft the stem; in other respects they are not decked, but have a roof or covering extending all over the vessel from the bows.

The paduakan is rigged with a tripod-mast and high pointed sail (or lyre tanjong). The tripod-mast is formed of three stout bamboos, and fitted in a similar manner to that of the Tartar galley, described at page 255.

The woodcut represents two of these curious vessels—one with its sail furled, the other under full sail.

Bugis or Macassar Praus.

The author of a most interesting modern work (1) on the Malay Archipelago appears to have made a voyage from Macassar to the Aru (or Aroo) Islands, a distance of 1,000 miles, in a native prau. These islands are quite out of the track of all European trade, and are inhabited only by black mop-headed savages, who, nevertheless, contribute to the luxurious tastes of the most civilised races. Pearls, mother-of-pearl, and tortoiseshell, find their way to Europe; while edible birds'-nests, and 'tripang,' or sea-slug, are obtained by shiploads, for the gastronomic enjoyment of the Chinese.

The trade to these islands has existed from very early times; and it is from them that birds of Paradise, of the two kinds known to Linnæus, were first brought. The native vessels can only make the voyage once a year, owing to the monsoons. They leave Macassar in December or January, at

(1) The 'Malay Archipelago,' by A. R. Wallace (1869).

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the beginning of the west monsoon, and return in July or August, with the full strength of the east monsoon. Even by the Macassar people themselves, a voyage to the Aru Islands is looked upon as a rather wild and romantic expedition, full of novel sights and strange adventures. (1)

To this 'Ultima Thule' of the East the author went, having the courage and daring to trust himself on a voyage of 1,000 miles in a Bugis prau, and for six or seven months among lawless traders and ferocious savages.

The prau is described by the author as a vessel of about 70 tons burthen, and shaped something like a Chinese junk. The deck sloped considerably downward to the bows, which are thus the lowest part of the ship. There were two large rudders; but instead of being placed astern, they were hung on the quarters from strong cross-beams, which projected out two or three feet on each side, and to which extent the deck overhung the sides of the vessel amidships. The rudders were not hinged, but hung with slings of rattan, the friction of which keeps them in any position in which they are placed, and thus perhaps facilitates steering. The tillers were not on deck, but entered the vessel through two openings, each about a yard square, into a lower or half-deck, about three feet high, in which sit the two steersmen. Should a heavy sea break over the vessel, there is nothing to prevent the water from having free access to the interior, and there are no water-tight bulk-heads.

In the aft part of the vessel was a low poop, about three and a half feet high, which formed the captain's cabin, its furniture consisting of boxes, mats, and pillows. In front of the poop and main-mast was a little thatched house, on deck, about four feet high to the ridge; and one compartment of this, forming a cabin six and a half feet long by five and a half wide, the author had all to himself, and he says it was the snuggest and most comfortable little place he ever enjoyed at sea. It was entered by a low sliding-door of thatch on one side, and had a very small window on the other. The floor

(1) The 'Malay Archipelago,' vol. ii. pp. 158, 159.

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was of split bamboo, pleasantly elastic, raised six inches above the deck, so as to be quite dry. It was covered with fine cane mats, for the manufacture of which Macassar is celebrated. Against the further wall were arranged his gun-case, insect-boxes, clothes, and books; his mattress occupied the middle; and next the door were his canteen, lamp, and little store of luxuries for the voyage; while guns, revolver, and hunting-knife hung conveniently from the roof.

Mr. Wallace contrasts this 'little snuggery' with the gilded and uncomfortable saloon of a first-class steamer. There was no paint, tar, grease, oil or varnish, and no new rope; but, instead of these, bamboo and rattan, coir rope, and palm thatch—pure vegetable fibres, which smell pleasantly if they smell at all. The vessel was rigged with two tripod-masts, similar to those of the Tartar galley described at page 255. The main-yard was formed of many pieces of wood and bamboo, bound together with rattans, in an ingenious manner. The sail carried by this was of an oblong shape, and was hung out of the centre, so that, when the short end was hauled down on deck, the long end mounted high in the air, making up for the lowness of the mast itself. The fore-sail was of the same shape, but smaller. Both these were of matting, and, with two jibs, and a fore-and-aft sail astern, of cotton canvas, completed the rig. (1)

The crew consisted of about thirty men, natives of Macassar and the adjacent coasts and islands. Their dress, generally, was a pair of trousers only, when at work, and a handkerchief twisted round the head, to which in the evening they would add a thin cotton jacket. Four of the elder men were 'jurumudis,' or steersmen, who had to squat two at a time in the little steerage before described, changing every six hours. Then there was an old man call the 'juragan,' or captain, but who we should call the first mate; he occupied the other half of the little house on deck.

The great mat sails are very awkward things to manage in rough weather, the only way to furl them being to roll up

(1) The 'Malay Archipelago,' vol. ii. pp. 160–2.

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the sail on the boom. It is dangerous to have them standing when overtaken by a squall. (1)

The large sails cannot be shifted round, to go on the other tack, without first hauling down the jibs; and the booms of the fore-and-aft sails have to be lowered and completely detached to perform the same operation. (2)

The Corocora (or Kora-Kora).

A corocora (or kora-kora) is a curious-looking boat or vessel, used chiefly by the inhabitants of the Molucca Islands; and the Dutch have fleets of them at Amboyna, which they employ as *guarda costas*.

The corocora has a very high stem and stern, and is generally fitted with outriggers, in the manner explained by the opposite engraving. They vary in size from small boats to vessels above ten tons burthen. On the cross-pieces which support the outriggers are often put, fore and aft, planks, on which part of the crew sit and paddle, when there is no wind; besides which, others who sit in the vessel use long oars. In smooth water, the corocora is propelled in this manner with considerable velocity by a good number of hands or banks of rowers. It is steered with two commoodies (broad paddles).

Captain Forrest, in his 'Voyage to New Guinea,' mentions a corocora he met with, which had six banks of paddles—three on each side, ranged on planks laid across the outriggers, and was manned by Papua men. This vessel belonged to one of the chiefs of those islands.

The author of the 'Malay Archipelago' describes a boat of the kind called 'kora-kora,' belonging to the Island of Batchian, as being quite open, very low, and of about four tons burthen. 'It had outriggers of bamboo, about five feet off each side, which supported a bamboo platform extending the whole length of the vessel. On the extreme outside of this sit the twenty rowers, while within was a convenient passage, fore and aft. The middle portion of the boat was covered with

(1) The 'Malay Archipelago,' vol. ii. p. 168. (2) Ibid. p. 173.

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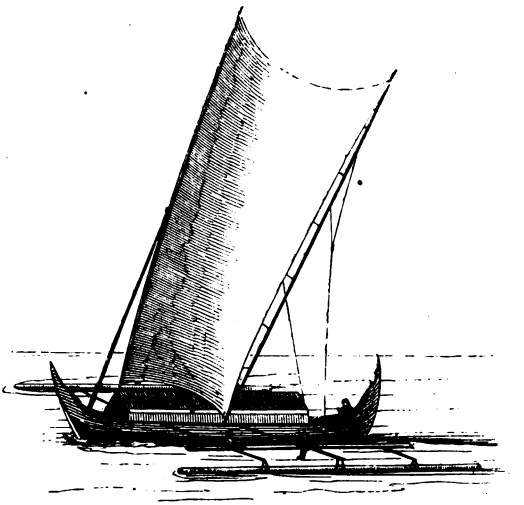

The Corocora.

a thatch-house, in which baggage and passengers are stowed. The gunwale was not more than a foot above water; and from the great top and side weight, and general clumsiness, these boats are dangerous in heavy weather, and are not unfrequently lost.' (1) They are rigged with a triangle-mast and mat sail, similar to some other vessels of the Indian Archipelago, already described.

In the kora-kora described by Mr. Wallace there was a little cook-house in the bows, where the passengers could boil their rice and make their coffee. And he adds:—'The passage would have been agreeable enough but for the dreadful "tom-toms," or wooden drums, which are beaten incessantly while the men are rowing. Two men were engaged constantly at them, making a fearful din the whole voyage.'(2)

Boats and Canoes of the Ké Islands.

The canoes which Mr. Wallace (3) saw at the Ké Islands, on his voyage from Macassar to the Aru (or Aroo) Islands, he

(1) The 'Malay Archipelago,' vol. ii. p. 69.
(2) Ibid. p. 69.
(3) Ibid. p. 176.

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describes as long canoes, with the bow and stern rising up into a beak, six or eight feet high, decorated with shells and waving plumes of cassowaries' hair. He also gives an admirable description of the whole process of their construction.

It appears that the natives of Ké excel in the art of boat-building. Their small canoes are beautifully formed, broad and low in the centre, but rising at each end, where they terminate in high-pointed beaks, more or less carved, and ornamented with a plume of feathers. They are not hollowed out of a tree, but are regularly built of planks, running from end to end, and so accurately fitted, that it is often difficult to find a place where a knife-blade could be inserted between the joints. The larger ones are from twenty to thirty tons burthen, and are finished ready for sea without a nail or particle of iron about them, and with no other tools than axe, adze, and auger. 'These vessels are handsome to look at, good sailers, and admirable sea-boats, and will make long voyages with perfect safety, traversing the whole archipelago from New Guinea to Singapore, in seas which, as every one who has sailed much in them can testify, are not so smooth and tempest-free as word-painting travellers love to represent them.'(1)

The forests of Ké produce abundance of magnificent timber, tall, straight, and durable, some of which is said to be superior to the best Indian teak. 'To make each pair of planks used in the construction of the larger boats, an entire tree is consumed. It is felled often miles away from the shore, cut across to the proper length, and then hewn longitudinally into two equal portions. Each of these forms a plank, by paring down with the axe to a uniform thickness of three or four inches, leaving at first a solid block at each end, to prevent splitting. Along the centre of each plank a series of projecting pieces are left, standing up three or four inches, about the same width, and a foot long; these are of great importance in the construction of the vessel.' The planks, when cut, are dragged to the beach. 'A foundation-piece, broad in the middle and rising considerably at each end, is first laid on blocks

(1) The 'Malay Archipelago,' vol. ii. p. 176.

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and properly shored up. The edges of this are worked true and smooth with the adze, and a plank, properly curved and tapering at each end, is held firmly up against it, while a line is struck along it, which allows it to be cut so as to fit exactly. A series of auger-holes, about as large as one's finger, are then bored along the opposite edges, and pins of very hard wood are fitted to these, so that the two planks are held firmly, and can be driven into the closest contact; and difficult as this seems to do—without any other aid than rude practical skill in forming each edge to the true corresponding curves, and in boring the holes so as exactly to match both in position and direction—yet so well is it done that the best European ship-wright cannot produce sounder or closer-fitting joints. The boat is built up in this way by fitting plank to plank till the proper height and width are obtained. We have now a skin held together entirely by the hard-wood pins connecting the edges of the planks, very strong and elastic, but having nothing but the adhesion of these pins to prevent the planks gaping. In the smaller boats seats, in the larger ones cross-beams, are now fixed. They are sprung into slight notches cut to receive them, and are further secured to the projecting pieces of the plank below by a strong lashing of rattan. Ribs are now formed of single pieces of tough wood, chosen and trimmed so as exactly to fit on to the projections from each plank, being slightly notched to receive them, and securely bound to them by rattans passed through a hole in each projecting piece, close to the surface of the plank. The ends are closed against the vertical prow and stern-posts, and further secured with pegs and rattans. The boat is then complete; and when fitted with rudders, masts, and thatch covering, is ready to do battle with the waves. A careful consideration of the principle of this mode of construction, and allowing for the strength and binding qualities of rattan (which resembles in these respects wire rather than cordage), makes me believe that a vessel carefully built in this manner is actually stronger and safer than one fastened in the ordinary way with nails.'(1)

(1) The 'Malay Archipelago,' vol. ii. p. 186.

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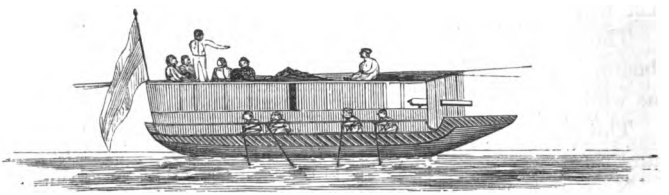
Malay and Dyak Canoes.

These canoes, which are made out of a hollowed tree, are long and narrow, and capable of being propelled with considerable swiftness. It is not unusual to find them so heavily laden, that any inclination on either side would let the water in over the gunwale; but if swamped, they do not sink. One of the crew is generally employed in baling out the water, with a scoop made of banana leaf.

The Dyaks' canoes are similar to those of the Malays. The Dyaks are much in the habit of standing upright in their canoes, and propelling them with their lances.(1)



Malay Prahu.

The Malay prahus, or war-boats, are curious. Being constructed for the purposes of war, they have a strong flat roof, or fighting-platform, extending the entire length of the boat and raised upon pedestals standing about five feet from the deck. Their principal weapons are the kris and spear, to use which with effect requires elbow-room. Some of them are also fitted with a gun, of large calibre and powerful range.

These vessels are built of timber at the lower part of the hull; but the upper part is of bamboo, rattan, and kedjang (the dried leaf of the nepa palm). They are also provided with a strong gallery, which runs outside the bends, about one foot from the water line; upon this the rowers sit, with their legs crossed. At the aft part of the prahu is the cabin for the chief who commands.(2)

(1) 'Borneo,' by F. S. Marryat (1848). (2) Ibid.

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Dyak War-Boats.

These are long-shaped canoes, of more substantial construction than the Malay prahus; and are, besides, sufficiently capacious to hold from seventy to eighty men.

They are made with a flat keel, having a curve or sheer of hard wood. A long keel does not exceed six fathoms, and upon such they build a boat of eleven fathoms, over all. The extra length is brought up with a sheer. The seams are caulked with a bark that is plentiful in the jungle. No other fastenings but rattans are used.

These boats are painted red and white. When they have no ochre for the red, they use a kind of red seed pounded; the white is simply a lime made from sea-shells.

The bark they employ for caulking is very tough; when beaten out, it serves to make useful and comfortable coverlets, as well as waist-cloths and head-dresses.(1)

The Dyak war-boat has also a roof or gallery to fight upon; and the stern is ornamented with feathers.

Notwithstanding the heavy top-weight of gallery and fighting men, these boats, as well as the Malay prahus, are remarkably swift under oars.(2)

Malay Pirate Prahus.

These are of much smaller size than those of the Sooloo (or Sulu) pirates, being only from ten to twelve tons burthen, but, in proportion, better manned, and the crew ply with more efficiency their oars or paddles.

These prahus infest the Straits of Malacca, Cape Romania, the Carimon Islands, and neighbouring straits; and they sometimes visit the Straits of Rhio.

They have a long, low hull, and are provided with several guns, though not very large ones. They seldom attack unless the sea is calm, whereby they can be more certain of success. They are generally found in small flotillas of from six to twenty.

(1) 'Life in the Forests of the Far East,' by Spencer St. John, F.R.G.S. F.R.S., &c. (1862).

(2) Marryat's 'Borneo,' &c.

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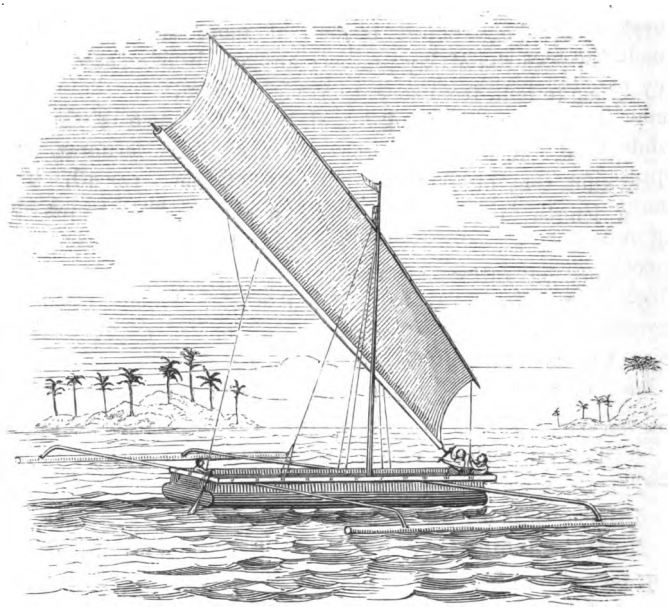

Jellore.

The rig of these prahus consists of two masts, with sails of matting. The crew are a cold-blooded race, and sometimes so numerous, and well armed with steel weapons, as not easily to be beaten off by the crews of ships, when once they get so near as to be out of danger of the ship's guns. A platform is erected over the bows of the prahu, and extending some distance beyond; this platform is as wide, or wider, than any other part of the boat, and is the rendezvous of the pirates when attacking a vessel.

Boats of Sumatra.—Jellores and Ballellangs.

These curious boats of the island of Sumatra are of a long and narrow form, and are fitted with double outriggers, which stand out a considerable distance from the sides. They are

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sometimes rigged with two masts and lyre tanjong sails, though sometimes with lug-sails. The ballellang is rather broader than the jellore, but still comparatively narrow; yet they mount two small swivel guns, and carry twenty or thirty men. They sail remarkably fast in light winds, and in strong winds too, if the water be smooth. The engraving opposite represents a jellore with the sail partly rolled up, after the manner of reefing adopted in those parts. The wide-spreading outrigger enables these vessels to carry a very large sail in smooth water. Jellores have sometimes only one outrigger, which is then alternately to windward and leeward; when to leeward it buoys up the boat, and when to windward counterpoises the power of the sail.

Panchallangs are vessels with one mast and the lyre tanjong.

The *bantang* has two masts, is tolerably large and broad, and has no outrigger.(1)

Achên Fisher-Boats.—The Kolay.

These boats, called by the natives *kolay*, are in shape something like a large Thames wherry, with the sides raised about twenty inches above the gunwale.

They are rigged with one mast and a square-sail, which is slung and set after the manner of a lug-sail, but with a boom and bridle below. To the fore end of the yard a rope is made fast, for the purpose of hauling it down and peaking the aft part. When it blows hard the sail is reefed, after the same manner as the lyre tanjong above described, i.e. with a cross-stick or pin, which passes through the inner end of the boom; whereby the sail may be easily rolled up, sheet and all, passing the lower end of the trunnel forward; and it may be unrolled with the same facility, as occasion may require. This seems to be a very convenient rig, and mode of reefing a small sail. Captain Forrest says he never saw anything so convenient in any European boat. In putting about, the sail is dipped in the same way as a lug-sail.

(1) See Forrest's 'Voyage from Calcutta.'

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The kolay is steered with an oar, which is passed through a lashing on the aft-quarter of the boat.

Praus of Ceram and the Matabello Islands.

The native praus of Ceram and the Matabello Islands are peculiar. In a description of one of about four tons burthen, it is said that there was not an ounce of iron or a foot of rope in any part of its construction, nor a morsel of pitch or paint in its decoration. The planks were fastened in the usual ingenious way, with pegs and rattans. The mast was a bamboo triangle, requiring no shrouds, and carrying a long mat sail; two rudders were hung on the quarters by rattans; the anchor was of wood; and a long thick rattan served as a cable. Our crew consisted of four men, whose sole accommodation was about three feet by four in the bows and stern, with the sloping thatch roof to stretch themselves upon for a change.(1)

In this little craft the author of the 'Malay Archipelago' travelled nearly a hundred miles, 'fully exposed to the swell of the Banda Sea, which is sometimes very considerable; but he luckily had it calm and smooth, so that he made the voyage in comparative comfort.'(2)

It appears that the praus of the Goram and Matabello Islands are all made by that wonderful race of boat-builders, the Ké Islanders, who, it is said, annually turn out some hundreds of boats, large and small, which can hardly be surpassed for beauty of form and goodness of workmanship.(3)

The Leper-leper of the Island of Amboina.

The common boats or canoes of the Island of Amboina are called *leper-lepers*. They are made from the trunk of a large tree, hollowed out, and then finished with pieces of plank, placed on the sides to raise them to the proper height. Both ends are sharp and curve upward. About four feet from the bow a pole is laid across, and another the same distance from the stern. These project outward from the side of the boat

(1) The 'Malay Archipelago,' by A. R. Wallace, vol. ii. pp. 92, 93.
(2) Ibid. pp. 92, 93. (3) Ibid. p. 107.

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six or eight feet, and to them is fastened a bamboo—the whole forming what is known as an outrigger. The canoes themselves are so narrow that without these external supports they would be very crank, and liable to be accidentally upset. And it would seem that the whole fabric is very shallow, for Mr. Bickmore (1) says, 'When we launched our *leper-leper*, placed on board our cargo of shells, and got in ourselves, her sides were only about four inches out of water.'

Boats of the Philippine Islands.

The Indians at Manilla are very skilful in the arts of building and managing boats.

On the river and along the shore may be seen a number of prettily-built boats, with sharp bows, and furnished with bamboo outlagers, (2) or poles, like the yard of a square-rigged vessel, laid across the boat and jutting out beyond the sides. When it blows hard, one, two, or more of the crew are put out on the windward end of the outlager, to counterpoise the effect of the wind upon the sail. This contrivance, however, does not always ensure safety, for at times the bamboo yards, which form the outlager, break; in which case the boat is seldom saved from capsizing, and the whole crew are lost. (3)

Pangues.

These are small ferry-boats, used chiefly for crossing the rivers; they are made of the hollow trunk of a tree. Those usually employed are large enough for two or three persons only, though a few of larger size are to be met with in the island. They are generally propelled by oars, assisted sometimes with a small sail.

(1) 'Travels in the East Indian Archipelago,' by Albert S. Bickmore, M.A. (1868), p. 165.

(2) These must not be confounded with the *outriggers* of the canoes of some other islands; there is no outrigger to these canoes, but merely an *outlager*, or pole, laid across the vessel amidships, and extending several feet beyond the sides.

(3) Dampier's 'Voyages.'

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Mindanao Pleasure-Proa.

Many of the boats of the Indian Archipelago are extremely curious. Dampier describes a pleasure-proa he met with at Mindanao, belonging to the sultan of that island. It was large enough to carry fifty or sixty persons, or more. The hull was neatly built, with a round head and stern; and over the hull was a small, slight house, built with bamboos, about four feet high, with neat little windows of the same, to open and shut at pleasure. The roof was almost flat, but neatly thatched with palmetto leaves. The house was divided into two or three small partitions or chambers, one in particular for the sultan himself, which was neatly matted underneath and round the sides, and furnished with a carpet and pillows. The second was the ladies' room, or that for the sultan's wives, and was much like the former. The third for servants, who attend the ladies with tobacco and betel-nut. The fore and aft part of the vessel was for the crew; but the outlager was the place for them when navigating the vessel.

The proa was fitted with outlagers on each side, but very different from the flying proas of the Ladrone Islands. The Mindanao proa has no flat side; both sides are rounded, or bilge-shaped, like an English skiff, and there is no outrigger-boat. Beams are placed across the protruding bamboos, and they do not touch the water on either side, like the Ladrone proa, but are two, three, or four feet above the surface, and serve for the boatmen or paddlers to sit and row or paddle from. If the proa reels or lists on one side, the beams dip in the water, and so the paddlers are often wetted and dipped up to their waists. (1)

Manilla Bancas.

The passage-boats of Manilla are termed bancas; they are much used on the canals, and, although made of the single trunk of a tree, are prettily formed, and are a very useful kind of boat. The trunk is carefully hollowed, so that the boat is very light, and rows easily. The bottom is narrow, and round-

(1) Captain Dampier's 'Voyages,' vol. i.

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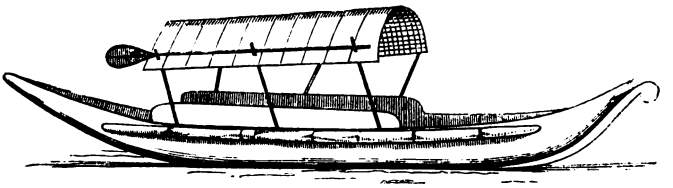

Manilla Banca.

shaped; therefore the banca is easily upset, under careless or awkward management.

The thwarts for the passengers are placed very low, so as to keep the weight of the occupants as close to the bottom as possible, and preserve the stability of the vessel. A stout bamboo is attached to the top rim of the banca, outside, which serves the purpose of a fender on going alongside, and also renders the vessel more buoyant when heavily laden, or when lurching on one side. The banca is also fitted with a light top or awning (as shown in the engraving), to protect the passengers from the heat of the sun.

These vessels are steered with a large shovel-like paddle (see engraving).

The Manilla Saraboa.

The saraboa is a fishing raft employed by the Manillas; it is composed of two or more layers of bamboos, or light wood, laid transversely one above the other, with a little Gothic hut at one end.

The native fishing is chiefly performed on rafts of this kind. They take fish at the mouth of the river, in nets suspended by the four corners from hoops attached to a crane, by which they are lowered into the water.

The paroa is a larger kind of trading or passage-boat used at Manilla.

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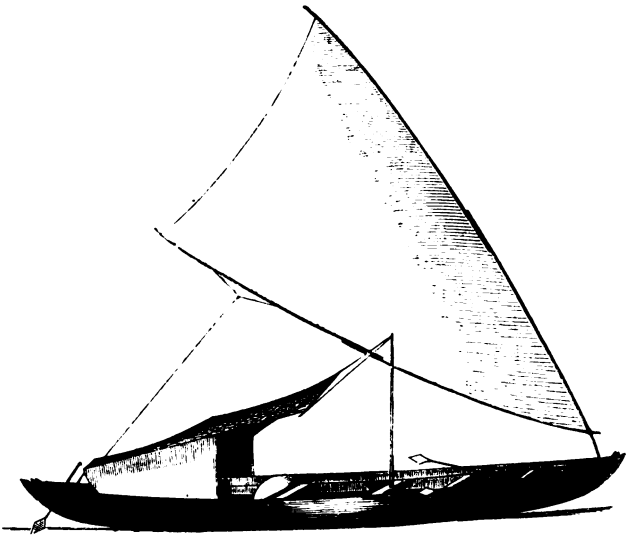

THE TAMBANGAN.

The tambangan, or Sourabaya passage-boat, of the Island of Java, is curiously rigged. The boat itself is very broad and shallow, but uncommonly roomy, convenient, and useful for its purpose. It is *partly* flat-bottomed, that is to say, it has, in part, a flat floor without a keel, but is flanged and rounded at the lower sides, like an English doble.

As to the rig, the sail is a very light one, of triangular shape, and is set with the apex downwards; and it has both yard and boom, both of which are in two parts.

A light canvas awning is set up in the aft part of the boat, in the manner represented by the engraving.

BOATS OF MADURA.

On the north coast of Java, at Madura, they have boats with outriggers, each boat having one such float on the leeward

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side; while, on a kind of rack on the windward side, they sometimes place a canoe and everything on board that is movable. Each boat carries two triangular sails, made of narrow white cloths, with occasionally a red or black one in the middle, or on the margins, by way of ornament. (1)

Maldive and Laccadive Boats.

The sea-boats of the Maldive and Laccadive Islanders have a very grotesque and antiquated appearance. Cocoa-nut is the wood used chiefly in their construction, there being no other in those islands suitable for the purpose. The planks are fastened together with hard wooden pegs: the larger boats are thus made very strong. The form of the Maldive boats is not much adapted for fast sailing, but they are broad and safe-looking vessels, rigged with two sails—lug-mainsail and large triangular fore-sail. The main-sail stands nicely flat, and is spread at the lower part with a boom, the fore end of which works in a rest or cross-piece a few inches before the mast; the fore-sail is large, and set out on a bowsprit. The stem of the Maldive boat is aquiline and curious.

Birman War-Boats.

The Birmese war-boats are constructed out of the solid trunk of a single teak-tree, which is hollowed partly by fire and partly by cutting. The largest of these boats are from eighty to one hundred feet in length; but the breadth seldom exceeds eight feet, and even that width is only produced by extending the sides after the trunk has been hollowed. The sterns of these boats turn up very high, and are shaped like the lashing tail of a fish; in fact, the whole fabric of the boat is in imitation of a very long fish, the broad flanges of the fish-tail serving as steps to the top of the high-peering stern. These boats are manned by fifty or sixty rowers; the oars used are short ones, and they are worked on a spindle. The steersman of a Birman boat is called the 'leedegee.'

The prow of these boats consists of a solid portion of the

(1) 'Travels in the East Indian Archipelago,' by Albert S. Bickmore, M.A., p. 56.

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tree, and has a flat surface, on which, when they go to war, they mount a piece of ordnance—a six, eight, or twelve-pounder. Each rower is provided with a sword and lance, which are placed by his side in the boat. In addition to the crew, there are usually twenty or thirty soldiers aboard, armed with muskets and other weapons. When they advance upon their foes, they sing a war-song, to encourage the men and regulate the strokes of the oars. They display considerable dexterity in the management of these boats; and when they retreat, they row backwards, so as to keep the large gun bearing upon the enemy.

The draught of water of these boats is very shallow, in proportion to their size, as the largest of them draw only about three feet. When a person of rank is aboard, there is usually a tilt or canopy placed over the part intended for his special accommodation. In Birman boats, the prow is always the place of dignity.

Some of these boats are gilded and ornamented down to the water's edge; but gilded boats are only permitted in those parts to princes of the blood and persons holding high stations, such as a Maywoon of a province, and a minister of State. (1)

SANDWICH ISLANDS CANOES.

The Sandwich Islands constitute a solitary group in the North Pacific Ocean, far north of the main range of islands in the Western Pacific.

The canoes of the native islanders are well made, considering that they are each constructed by hollowing out the trunk of a tree. They are, however, very ticklish, and easily upset. Those which are used singly are fitted with a small log of wood for an outrigger, which is armed with a cut-water at the fore end; the whole standing out several feet beyond the canoe, in the form represented by the engraving on opposite page.

The double canoes of these islands consist merely of two ordinary canoes, held together, at the space apart of from four

(1) Syme's 'Embassy to Ava,' A.D. 1795; 'Voyages and Travels,' &c.

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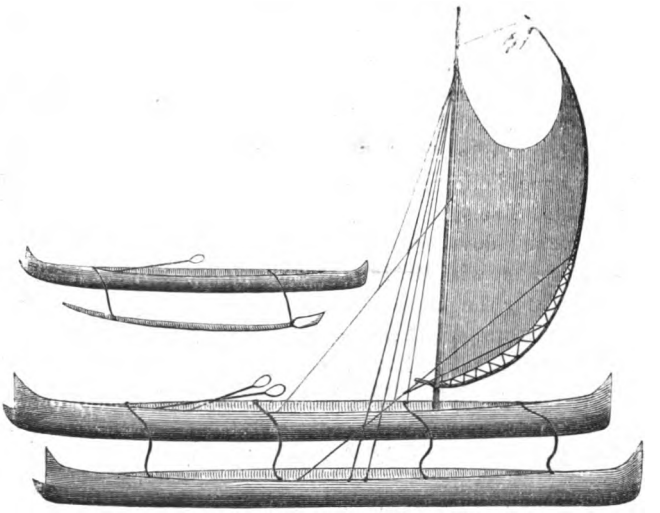

Sandwich Islands Canoes.

to six feet, by very strong beams, which are arched and stand up above the canoes. They are sometimes assisted with a small sail, of very primitive form, the mast for which is stepped in one of the canoes, and the sail sheeted in the other.

The bow and stern of the Sandwich Islands canoes are ingeniously shaped, and are different to those of any other islands (see the above engraving).

FEEJEE CANOES.

THE sailing-canoes of the Feejees, or Fiji Islanders, are of a very superior class. The largest size are as much as a hundred feet in length, and of the double or twin form, consisting of two canoes of different sizes united by cross-beams, on which a platform is laid. But although these are called 'double canoes' by Europeans, the second, or attached canoe, is in fact an outrigger, the bottom part of which is composed of a tree, hollowed out for the sake of buoyancy, like the canoe

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itself. The mast and sail are fitted to the larger of the two canoes; the smaller one, as above stated, serving as an outrigger to the other. (See the engraving opposite.)

These canoes are generally built of a native-wood, known as the vas-wood.

The bottom of each of the canoes is formed of the trunk of a single tree, hollowed out and built upon with considerable ingenuity. The sides and coamings are fitted and secured to the canoe by dove-tailing the planks, which are also drawn closely together with lashings of cocoa-nut plait, passed through flanges left for the purpose on each of the planks. The joinings and crevices are filled and closed with gum taken from the breadfruit-tree, which is also used as an outer dressing, in the place of tar or paint. The planks are secured inside to small ribs, or timbers, which are placed at regular intervals, according to the usual mode of boat-building.

The fore and aft ends of the two vessels forming the double canoe are decked over; the larger one to the extent of about twenty feet at each end, and the smaller one somewhat less. This is done to prevent the shipping of seas in rough water.

The platform is firmly secured over the top of the open part of the canoes, resting on the cross-beams and raised sides (or coamings), and extending, on the outer sides, two or three feet beyond them. The depth of hold under the platform is about seven feet.

On the platform, nearly amidships, between the two parts of the canoe, there is a stage, about eight feet square by four or five high, with a railing on each side. On the stage there is space for several persons to stand or sit, more particularly for those who give directions as to the steering and management of the canoe. Beneath the stage is a small thatched house or cuddy, for the crew when seeking protection from the weather.

The covered fore and aft part of the canoes belonging to the chiefs of the Feejee Islands are prettily ornamented with shells, and the sails with white flags and streamers.

The sail of the Feejee canoes is of triangular shape, and so large as to appear quite out of proportion to the vessel. It is

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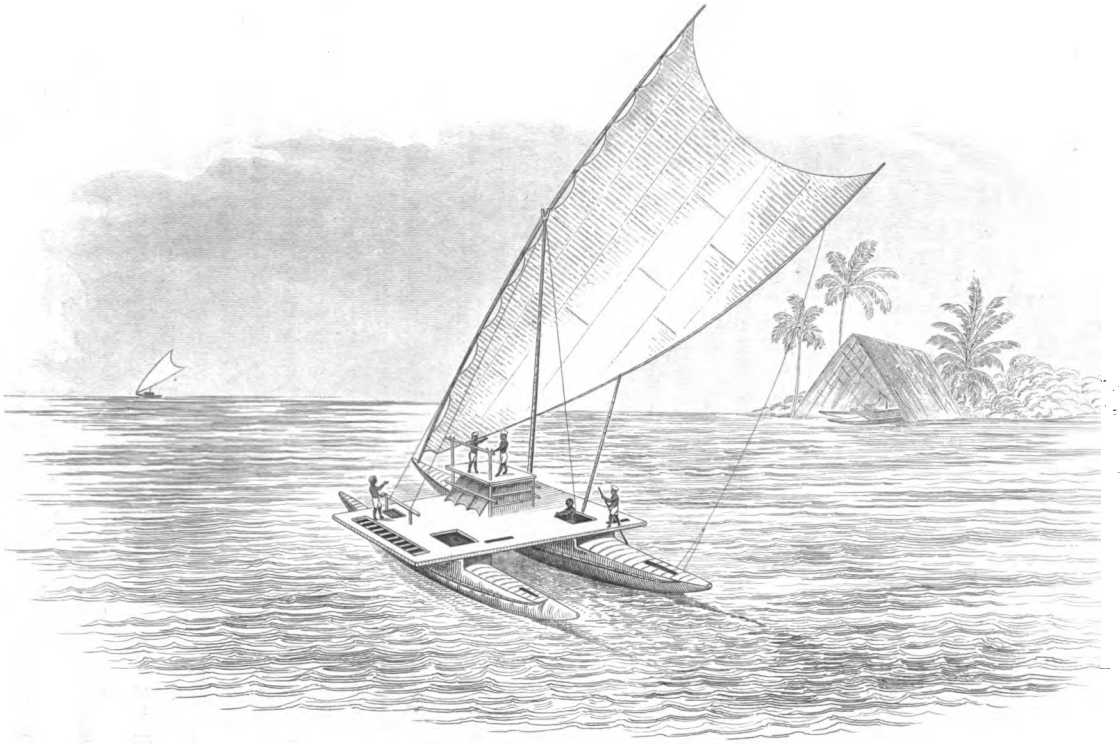

FEEJEE ISLANDERS' SAILING CANOE

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made of tough yet pliable matting, and it is set with the apex downwards.

The mast is about half the length of the longer of the two vessels composing the canoe. It is stepped into and secured by a chock on the platform, at an equal distance from each end of the larger canoe. The yard is nearly twice as long as the mast, and the boom somewhat less than the yard.

The halliards are passed over a crescent at the top of the mast. They are bent on to the yard nearly in the middle, or so that, when the sail is hoisted with the fore end of the yard secured on deck, the seizing on the yard comes nearly upon a level with the top of the mast.

The mast is supported to windward by two ropes or shrouds, fastened to a bit or rail fixed to two posts and fitted to the platform, so that the heels of the posts are secured to the outer side of the coamings of the smaller of the two vessels.

The Feejee Islanders are very expert in the management of these vessels, both ends of which being alike, they are sailed either end foremost; but when under sail, it is necessary that the smaller canoe or outrigger should always be on the weather side, therefore the canoe itself is never tacked, but the sail. The process of tacking will be better understood if given in the words of one who has seen it performed:—'The operation of tacking was effected by luffing into the wind, when the rake of the mast, which is stepped on a kind of hinge, and always inclines forward, was reversed, and at the same time a number of men, clapping on the tack of the sail, or the point where the yard and boom meet, hauled it aft. The yard, being nicely poised in the slings, and hoisted over a fork at the mast-head, then swung round, and the "unwilling tack" was dragged to the loop, or becket, into which it was inserted at the other end of the vessel. The business was conducted apparently with very little order, and the process occupied a much longer time than that of tacking ship would have done with us.' (1)

Under the skilful handling of the natives, these canoes are enabled to carry sail in heavy winds, and to travel fast,

(1) Erskine's 'Western Pacific Islands,' p. 139.

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preserving an almost upright position. This is maintained by several of the crew squatting on the windward side of the platform, or in the hold of the outrigger, and thus, by the extra weight, counterbalancing the pressure upon the sail.

It is customary for the chief to hold the end of the sheet, and it is, therefore, his task to prevent the upsetting of the canoe or the carrying away of the mast. The canoe is steered with a large-bladed oar, of stout proportions.

In smooth water these vessels sail very swiftly; but when any extra pressure of sail is put upon them, it is found that their hulls are scarcely equal to the strain, and they become leaky, and require one or two hands to be constantly baling out the water.

They, nevertheless, make long voyages of hundreds of miles —to Tonga, Kotuma, and the Samoan Islands.

The building of one of these double canoes frequently occupies several years. Even a small one is never built under three or four months. The tools employed are of the simplest kind, consisting chiefly of an axe, gimlet, chisel, and knife; and a few nails, obtained by barter with Europeans, have been used of late years.

The carving is performed with tools made of the teeth of small animals, set in hard wood; and yet the workmanship is excellent.

DIMENSIONS OF A FEEJEE DOUBLE CANOE OF THE MOST COMMON SIZE :— (1)

	feet.		feet.
Length of larger canoe	70	Breadth of cuddy	6
,, smaller canoe	55	Height of platform above water line	10
Distance of the canoes apart	7	Draught of water	2 to 3
Length of platform	30	Length of mast	35
Breadth of do.	15	Length of yard	60
Length of cuddy	15	Booms	15 and 35

A canoe of this description will carry conveniently forty or fifty persons.

(1) Wilkes' 'United States Exploring Expedition.'

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CANOES OF THE FRIENDLY ISLES.

THERE is a great similarity between the canoes of these islands and those of the Feejees; and there can be no better evidence as to the ingenuity of the inhabitants than in the art displayed by them in the construction of these vessels, which, in point of neatness and workmanship, are stated by Captain Cook (1) to exceed anything of the kind he met with in the Western Pacific. The planks, or pieces of which they are composed, are sewn together with bandages in so neat a manner that on the outside it is difficult to see how they are joined, all the fastenings being on the inside, and passing through cants or ridges, which are wrought on the edges and ends of the several boards which compose the vessel.

All those which are called single canoes have outriggers, and are sometimes navigated with sails, but more generally with paddles, the blades of which are short, and broadest in the middle. The single canoes are from twenty to thirty feet in length, and about twenty or twenty-two inches broad in the middle. The stern terminates in a point, and the head in a wedge-like form. The fore and aft parts of the canoe are covered over, or decked, to the extent of one-third part of the whole length of the vessel, and open in the middle. In some of these canoes the middle of the deck is ornamented with white shells, stuck in a row on little pegs, wrought out of the same piece which composes it.

The double canoes of these islands are composed of two vessels, each about sixty or seventy feet long, and four or five broad amidships, and each end terminates nearly in a point, similar to the single canoe; but those which compose the double canoe have sides or coamings round the middle or open part, in the form of a long trough, composed of boards closely fitted together, and well secured to the body of the vessel. The double canoe is formed of two of the last-described vessels fastened together, parallel one with the other, about six or seven feet apart. The joining together is effected by means of

(1) See Cook's 'Voyage towards the South Pole.'

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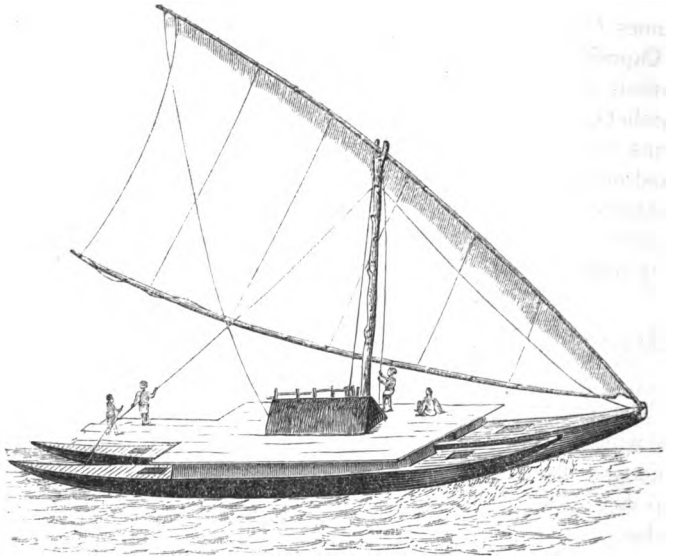

Friendly Isles Double Canoe.

strong cross-beams, supported by stanchions fixed to the canoes, and secured by bandages and lashings of sennit, made of cocoa-nut bass. Upon these beams a boarded platform is laid and fixed, extending from side to side, and a little beyond the outer side of each canoe, the width from outside to outside being thirteen feet nine inches; and thus the double canoe is made very strong and burthensome, but light and buoyant as the nature of the work will admit, and so it becomes a vessel of burthen fit for distant navigation. (See the illustration above.) The double canoe is rigged with one mast, the heel of which is stepped and secured through the platform into the fore part of one of the canoes, and can be raised or lowered at pleasure. The sail is made of matting, and of triangular shape, with the apex downwards. It is fitted to a long yard and boom. On the platform of the double canoe a cabin or hut is erected, which generally contains a movable fireplace, or trough of wood filled with stones. There are

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hatchways leading through the platform into each hold of the canoes. (1)

Captain Cook observes that the only tools used by the natives of the Friendly Isles in constructing their boats are: hatchets, or rather thick adzes, made out of a smooth black stone which abounds at Toofoa; augers, made of sharks' teeth fixed on small handles; and rasps, of the rough skin of a fish fastened on flat pieces of wood. With tools such as these they contrive to build these curious vessels; and they make them not only neatly, but strong and durable.

Sailing and Management of the Double Canoes of the Friendly Isles.

These twin canoes are rigged with one sail only. The slings by which it is hoisted are attached to the yard nearly in the middle. When the natives change tacks, they luff the canoe up into the wind, ease off the sheet (just as the Ladrone Islanders do), and bring the heel or tack-end of the yard to the other end of the boat, and the sheet in like manner. There are notches or sockets at each extremity of the vessel, in which the end of the yard fixes. When they sail before the wind, the yard is taken out of the socket, and the sail is squared.

All the sailing-vessels of these islanders are *not* rigged to sail in the same manner; some of them, of the largest size, are rigged so as to tack about. These have a short but stout mast, which steps on a kind of roller that is fixed to the deck near the fore part. It (the mast) is made to lean or incline very much forward. The head is forked, on the two points of which the yard rests as on two pivots, by means of two strong wooden cleats secured to each side of the yard, at about one-third its length from the tack or heel, which, when under sail, is confined down between the two canoes by means of two strong ropes passing through a hole at the head of each canoe; for it must be observed that all the sailing-vessels of this sort are double. The tack being thus fixed, it is plain that in changing tacks the vessels must be put about. The sail and

(1) Captain Cook's 'Second Voyage.'

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boom on the one tack will be clear of the mast, and, on the other, will lie just as a whole mizzen. (1)

'The outriggers, and ropes used for shrouds, &c., are all stout and strong. Indeed, sail, yard, and boom are altogether of such an enormous weight that strength is required.' (2)

In order to form some idea as to the rate of sailing of these canoes, Captain Cook tried experiments on board one of them with the log-line, and found the rate to be about seven knots an hour, the canoe being close-hauled, and the wind very strong.

Tongese Canoes.

The canoes of the Island of Tonga (or Tongataboo) are precisely similar to those of the Feejees—indeed, the large Tongese canoes are generally built in the Feejee Islands, as Tonga produces no timber fit for the purpose; but the Feejeeans are said to have acquired the art of building their large double canoes from the Tongans.(3) In all these canoes, whether double or single, there are small hatchways at both ends, with high coamings; and it would appear as if they constantly leaked, for whenever they are seen under way there is always some one in each of the end-hatchways baling out the water.

The double canoes, or those with a heavy outrigger, sail much faster on a wind than before one; and it is obvious that these vessels require a peculiar kind of seamanship, but in which the Tongese are particularly expert. When there is no wind, they propel the canoe by a mode of sculling that is peculiar to the Tongese and Feejees. The sculler, instead of using the oar in the regular way, stands behind it, holding it perpendicularly, in a manner so as to throw the whole weight of his body upon the oar, and so assist his strength in using it. The oar is thrust through a hole in the platform, and so confined whilst being employed. These oars are ten feet long, and have broad blades. There is generally one oar at each end. When several oars are used, the Tongese scullers are

(1) Cook's 'Voyage towards the South Pole,' vol. ii. p. 17.
(2) Ibid. p. 17.
(3) Erskine's 'Western Pacific Islands,' p. 439.

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kept in strict time by a tune or song, in which they all join; this custom, however, does not appear to be practised among the Feejees.

These apparently fragile vessels are navigated, in the face of trade-winds, voyages of hundreds of miles to and fro between the Fiji, Samoan, and Tonga Islands.

Wilkes (in his 'U.S. Exploring Expedition,' vol. iii.) speaks of a canoe he saw off the Island of Ovolau, belonging to Tanoa, the King of Anibau, which was under the management of a crew of forty Tongese. He says:—'It had a magnificent appearance, with its immense sail of white mats; the pennants streaming from its yard denoted it at once as belonging to some great chief. It was a fit accompaniment to the magnificent scenery around, and advanced rapidly and gracefully along. It was a single canoe, one hundred feet in length, with an outrigger of large size, ornamented with a great number (2,500) of the Cyprœa ovula shells. Its velocity was almost inconceivable, and every one was struck with the adroitness with which it was managed and landed on the beach.'

The same author also adds:—'I was told that Tanoa frequently amuses himself, when sailing, by running down canoes, leaving those who belong to them to recover their canoe and property the best way they can.'

The platform is the general resort of those aboard the double canoes of the Tongans; the hull, even of the main canoe, is seldom occupied by any one except those employed in baling out the water at sea.

These canoes, as also those of the Fiji Islands, are carefully protected when not in use, and placed under cover of the lofty canoe-sheds which are erected on the beach.(1)

The smaller canoes of the Tongese are similar to those of the Samoan Islanders.(2)

(1) Erskine's 'Western Pacific.' Wilkes' 'Voyages.'
(2) *Infra*, page 285.

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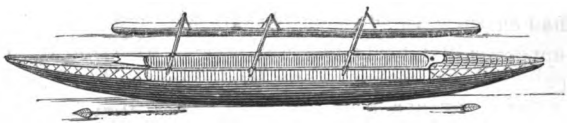
Fulangese Canoes.

The Island of Fulanga is one which produces fine timber; and it is, therefore, much resorted to by the Vavao and Friendly Islanders, as the depôt for canoe-building.

Commander Wilkes, who visited this island about the year 1840, makes mention of three large canoes he saw in the process of construction under a long shed. One of these vessels, on measurement, was found to be 102 feet long, seven feet wide, and five feet deep; and he speaks of it as 'a beautiful model.' The other two were somewhat smaller. The builders informed him they were intended for a Vavao chief, and the work was being performed under a contract, the price agreed on to be paid in whales' teeth, axes, guns, &c.



SAVAGE ISLAND CANOES.

The main part of these canoes are made from a single tree, wash-streaks being afterwards fastened to the sides, which are low. The fore and aft parts are covered over, and handsomely carved. They are from twenty to twenty-four feet long, and furnished with an outrigger, composed of a log of wood, which floats in the water parallel with the canoe, and is kept in that position by three small spars placed across the gunwales of the canoe. The outer ends of the spars are fastened to the log, but raised to the level of the sides of the canoe by means of small props affixed to the log; the cross-pieces or spars, so fixed, also form a sort of platform, on which the crew lay their spears and other implements.

The contrivance of the outrigger is absolutely necessary to enable these narrow canoes to maintain their equilibrium in the smoothest water; but the outrigger must not be confounded with that of an outlager, or spar projecting to wind-

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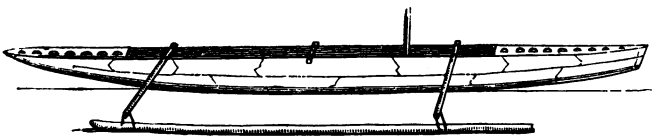
ward when under sail, to enable the canoe to be ballasted or counterpoised by some of the crew going out and sitting upon it, (1) as described under the head 'Samoan Canoes' and others. Outriggers are common to most of the canoes of the Pacific.

The paddles employed in these canoes are very prettily shaped, like a plantain leaf; they are short and concave in the blade, and handsomely carved.

NEW CALEDONIA AND LOYALTY ISLAND SAILING-CANOES.

Captain Erskine (2) alludes to some large canoes he met with in these islands, rigged with two sharp-headed sails of matting, laced to long flexible yards, and having somewhat the appearance, when set, of the sprit-sails in common use among the Thames barges. They appeared to be fitted for long voyages, and had earthen fireplaces constructed on deck. They were each apparently capable of accommodating thirty persons on board.



SAMOAN CANOES.

The natives of Samoa, or Navigator's Islands, display very considerable skill in the construction of their canoes.

The largest of the Samoan canoes are from thirty to sixty feet in length, and capable of carrying from ten to fourteen paddlers, besides a sitter. They are formed of planks, fastened together with sennit. There is no regularity in the length or breadth of the planks. On one of the edges of each plank a ledge or projection is formed, which serves to attach the sennit, and to connect and bind it closely to the adjoining one. The labour bestowed in

(1) Erskine's 'Western Pacific Islands.' (2) Ibid.

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joining so many small pieces of plank is surprising. Before the pieces are joined, gum from the bark of the breadfruit-tree is used to stick them close, and prevent leakage. On the outside, the pieces are so neatly joined as to require a close examination before the seams can be detected; and this perfection of workmanship is the more astonishing, when it is considered that the only tools they use are a gimlet or piercer, and a piece of iron tied to a staff, thus forming a sort of adze.

These canoes are long and narrow, and their shape approaches even to elegance. They are decked fore and aft, and provided with an outrigger, as shown in the engraving.

When propelled with paddles, the natives sit two abreast, and the canoe is guided by a steersman. The seat of honour is on the forward deck, in the centre of which is a row of pegs, which are covered with the large white ovula shell, by way of ornament. The striking peculiarity of these canoes (and in which they differ from those of other islanders) is that they have both prow and stern, and therefore the sail cannot be shifted without tacking the boat; consequently, the outrigger that constitutes their safety under sail is alternately to windward and leeward; when to leeward it is not half the protection to the canoe, in preserving its stability, that it is when to windward. These canoes, however, carry less sail than those of the other natives of Polynesia; and in order to guard against the danger of upsetting when the outrigger is to leeward, the precaution is taken of rigging a *suati* (i. e. a sprit or boom), which projects from the windward gunwale, and in some respects answers the purpose of an outrigger. When the wind is heavy, one or two of the crew go out upon the *suati*, and so counterpoise the canoe against the force of the wind.

The sail is made of matting, in the manufacture of which considerable labour is sometimes bestowed. It is of triangular shape, and set with the apex below, the sail standing about ten feet high. The mast is stepped at about one-third from the bows. The matting used for the sails is made entirely by hand, by interlacing the fibres. Some of the finest textures

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are as soft and pliable as cotton canvas. These canoes are not calculated for long voyages.

The Samoans have no large double canoes, such as those of the Tongans and Feejeeans, except those which they procure by barter with those islanders. (1)

The usual Samoan fishing canoe is made of a single tree, with a small outrigger to balance it.

Manuan Canoes.

The canoes of the Island of Manua are described by Wilkes, in his 'United States Exploring Expedition,' as the best among the islands of the Samoa group.

They are from thirty to forty feet in length, and sufficiently capacious to accommodate twenty or twenty-five men.

The bottom of these canoes consists of a log, or trunk of a tree, hollowed and shaped as a foundation, and then raised upon with boards or strips of wood, both ends being partly covered or decked. The canoe is also provided with an outrigger, but which does not stand out so far from the side as the outriggers usually attached to the canoes of other islands.

The Manuan canoe is propelled with great swiftness by hand-paddles, in the usual way.

The seat of honour in these canoes, or place where the chief sits (with his legs crossed), is on the forward platform or deck. (2)

UNION GROUP ISLANDS CANOES.

The canoes of the Union Group, Western Pacific Islands, are single canoes, with outriggers, resembling those of the Samoan group, being made of pieces of wood sewed together, and partly decked over the fore and aft parts; they are also ornamented, fore and aft, with ovula shells, in the same manner as the Samoan canoes. 'No sails were observed, but a small

(1) Erskine's 'Western Pacific.' Wilkes' 'Exploring Expedition.'
(2) Wilkes, vol. ii.

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Union Group Islands Canoe.

model of a canoe, purchased among the curiosities, had the usual triangular sail. (1)

The blades of their paddles also resemble those of the Samoans, being oblong and slender.

KINGSMILL ISLAND CANOE.

THE canoes of the Kingsmill and Ellice's Group, Western Pacific Islands, have many peculiarities. They are commonly from twelve to fifteen feet in length, from two to three feet in depth, varying from fifteen inches to two feet in width; those in the northern islands being much larger—some of them sixty feet in length.

These canoes are very well modelled, and, in some respects, better built than those of any other island in the Pacific; they have considerable sheer, and are built in frames, each canoe having six or eight ribs or timbers. The sides are in irregular pieces of cocoa-nut plank, varying in length from a few inches to six or eight feet, and from five to seven inches in width. They are joined very neatly, and sewn with sennit; and in order to make them water-tight, they insert slips of the pandanus leaf under and between the planking, in the same way as brown paper is used in boat-building.

The manner in which they attach the upright to the flat timbers displays considerable ingenuity. They are so secured as to possess all the virtue of a double joint, making them easy in a sea-way, and capable of withstanding the force of the waves. One side of the canoe is nearly flat, and in this respect they resemble the proa of the Ladrone Islands. They

(1) Wilkes' 'United States Exploring Expedition,' vol. v. p. 11.

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Kingsmill Island Canoe.

are also provided with an outrigger, but of smaller proportions than those of other islands, and the stage or platform covers less space.

These canoes are tacked and sailed in the same manner as those of the Feejee Islanders, the outrigger being always kept to windward, so that they sail with either end foremost.

Wood being an exceedingly scarce article with the natives, the masts and yards are of several pieces neatly joined together.

The shape of the sail is triangular, and very similar to that of the Feejee canoes; the mast is stepped in a fore-raking position, and the boom is considerably elevated.

The natives are very expert in the management of these canoes, and always avoid using paddles as much as possible.

Their paddles are made of a piece of cocoa-nut board, or tortoiseshell, about six inches square, and secured to a round stick for a handle. Some of their canoes are built entirely of wreckage wood, which is always a great prize to them.

Notwithstanding the odds and ends of which these canoes are composed, they are strong and durable, and also elegant in shape. One of them, of a suitable size for ten persons, occupies five or six months in building. (1)

BOATS OF TAHITI. (2)

THE canoes or boats of Tahiti (or Otaheite), and the neighbouring islands, may be divided into two general classes—ivahahs and pahies.

(1) Wilkes, vol. v.

(2) See Dr. Hawkesworth's 'Voyages,' vol. ii. cap. 18.

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The ivahah, in shape, is wall-sided and flat-bottomed; it is used for short excursions to sea. The pahie is bow-sided and sharp-bottomed, and is used for longer voyages.

The ivahahs are all after the same shape or pattern, but vary in length from ten feet up to seventy or more. The breadth is in no way proportionate; those of ten feet long are about one foot wide, whilst those of seventy feet long are scarcely two feet wide.

Ivahahs may be classified as war-ivahahs, fishing ivahahs, and travelling ivahahs, the war-boat being by far the largest, with the head and stern peering in a crescent-like form to the height of seventeen or eighteen feet in some of the boats, though the body be only three feet deep. These ivahahs never go to sea singly, but two are lashed together side by side, and kept at a distance of about three feet apart by strong poles laid athwart the gunwales; and upon these, in the fore part, the fighting-stage or platform is raised on pillars, about the height of six feet, the stage being about ten or twelve feet long, and somewhat wider than the boats.

The fishing ivahahs vary in length from ten feet to about forty; all that are of the length of twenty-five feet and upwards occasionally carry sail. Two of these boats are sometimes joined together by means of a platform, on board of which a little house is erected; but this is not common.

The travelling ivahahs are always double, and fitted with a small neat house, about five or six feet broad, and six or seven feet long; it is erected on the aft part of the platform, for the convenience of the principal occupants of the boat, who sit in it by day and sleep there at night.

All these ivahahs have high-peering sterns: in those twenty-five feet long the stern rises about four feet, and so in proportion. The bows and stem are covered with a board, which projects forward about four feet, and forms a sort of fore-deck or standing-place; the only advantage of which appears to be, the convenience it offers for stepping in and out from the beach.

The pahie also varies in length from thirty up to sixty feet;

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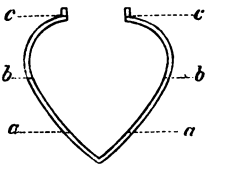
but, like the ivahah, is very narrow. The sectional form of the pahie is rather full, as shown in the engraving opposite, which will also illustrate the manner in which they are built. The first stage, or kelson, *below* the dotted line *a a*, is formed of a tree, hollowed out like a trough; this part sometimes consists of three trees, as one could not be had of sufficient length. The next stage, or that between the dotted lines *a a* and *b b*, is formed of straight planks, about four feet long, fifteen inches broad, and two inches thick. The third stage, or that between the dotted lines *b b* and *c c*, is, like the bottom, formed out of the trunks of long trees, hollowed into its bilging form. The upper part, or *coamings*, as they are termed in English boats, is formed of straight planking.



Section of Pahie.

To form all these parts separately, without saw, plane, chisel, or any other iron tool, may well be thought no easy task—still less so to join them together; but the natives do so with considerable ingenuity, by sewing, clamping, and lacing them with strong thongs of plaiting: and the nicety with which this is done may be inferred from the fact of their being sufficiently water-tight for use without caulking. As the plaiting soon rots in the water, it is renewed at least once a year; in order to do which, the vessel is taken entirely to pieces.

The head and stern are rude, with respect to design, but very neatly finished and highly polished.

The pahies, like large ivahahs, are used for fighting, but principally for long voyages. Two of these are fastened together, side by side, in the same manner as the ivahahs. They are also fitted with a stage or platform, proportionately larger than those of the ivahahs, as the form of their bottoms enables them to sustain a much greater weight.

Those that are used for sailing are generally double, and the middle-sized are said to be the best sea-boats. The natives are sometimes a fortnight or more at sea in these boats, and could go longer voyages, if they had more stowage for provisions and water.

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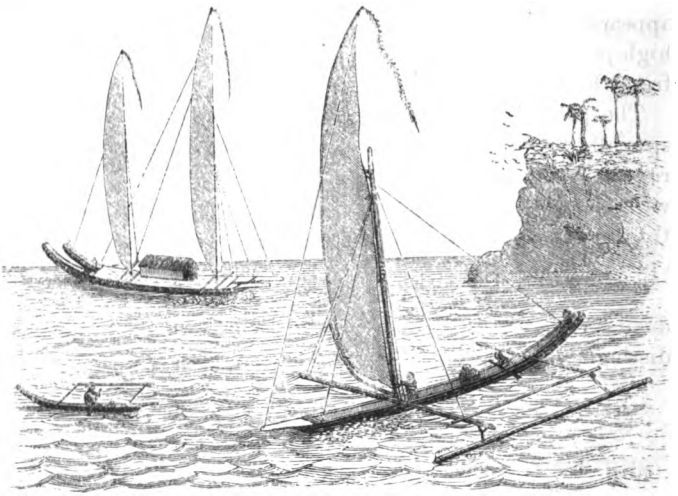

Boats of the Island of Tahiti.

Those that are sailed singly are fitted with a log of wood, or outrigger, which is fastened to the end of two poles that are placed across the vessel, and project over to windward from six to ten feet beyond the sides, according to the size of the pahie. The outrigger is essentially necessary to preserve the stability of these vessels when the wind is heavy.

Some of them are rigged with one mast, and some with two. When the length of the pahie is thirty feet, that of the mast is somewhat less than twenty-five. It is stepped through the frame that is placed across the canoe.

The sail, which is made of matting, stands about one-third higher than the mast, and very much peaked at the top, square at the bottom, and curved at the side—somewhat resembling what we term a shoulder-of-mutton sail. The sail is completely framed with wood, and there is no contrivance either for reefing or furling it. At the top of the mast, and peak of the sail, are placed a bunch and streamer of feathers, as shown in the engraving. They have no other contrivance for steering than the paddles, which two or more of the crew use at the aft part of the pahie.

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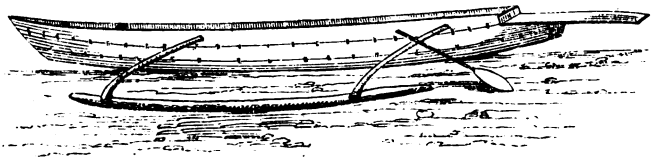
The only thing in which these remarkable vessels excel appears to be in the great advantages they possess, with their high-peering sterns, for beaching or landing, and putting off from the shore in a heavy sea, without shipping water.

The pahies are kept with great care in boat-houses, built specially for their reception. These are formed of poles set in rows in the ground, the tops being drawn together and fastened with cord, forming a sort of Gothic arch, which is then thatched from the arch to the ground, the ends only being left open. Some of these canoe-sheds are fifty or sixty yards long.

When on their long voyages, the natives steer by the sun during the day, and by the stars at night, many of which they distinguish by names. (1)



Common Tahitian Canoe.

The common canoes of the Island of Tahiti are of better form and construction than those of the Disappointment Islands.

The outrigger in some of these canoes is neatly secured on one side of the canoe, by thrusting the pieces which support it *through* the upper strake of the canoe, instead of over the top. The common Tahitian canoe is also provided with a similar landing-stage to that of the ivahahs and pahies, except that it is placed at the stern, (2) instead of the bows.

The trading canoes of Tahiti are somewhat different to the last described, inasmuch as the outrigger of the trading canoe is attached in the more usual way, the bearers being lashed across the top gunwales.

These canoes are propelled with small paddles, which are employed on the opposite side to that on which the outrigger is placed.

(1) Hawkesworth's 'Voyages,' vol. ii. (2) Wilkes, vol ii.

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THE PIROGUE,

WHICH is frequently confounded with the proa, is a remarkable description of boat used by the islanders in the South Seas. It is furnished with an outrigger, but the form of the pirogue is totally different to the proa, the hull being made from the hollow trunk of a single large tree, and with both sides alike. A platform, which is much wider than the hull of the pirogue, is placed across the gunwale, the outer end of which rests upon a floating log nearly as long as the pirogue itself. The sail of the pirogue is considerably smaller, in proportion, than the sail of the proa; it is, however, of triangular shape, and is set with the apex downwards.

Smaller pirogues are worked with paddles, and no sail is used. There are various other forms of outriggers used in the Indian Ocean, some of which have one on each side the boat; but, as these are very narrow, the projecting apparatus is made of bamboo cane, and at either or both extremities a narrow log of wood is suspended, carved in the form of a boat.

DOUBLE CANOE OF THE PAUMOTA GROUP.

THE Paumota Group is a range of very low coral islands, in the Low or Dangerous Archipelago, extending E.S.E. from the Society Islands.

The double canoes of the Paumota Islands are remarkably curious. They are composed of two canoes, each thirty-five feet in length, by four and a half in width, which are joined side by side by means of a strong framework of wood, and a platform which extends nearly over the whole surface of the two vessels. When long voyages are undertaken in the double canoe, a temporary hut is erected on the platform.

Every part of these canoes is neatly put together, and secured with twine and sennit, made of cocoa-nut fibres. No iron or metal of any kind is used in their construction, nor hempen nor Manilla rope for the sails and rigging. They are fitted with two masts, the shrouds and rigging of which are merely

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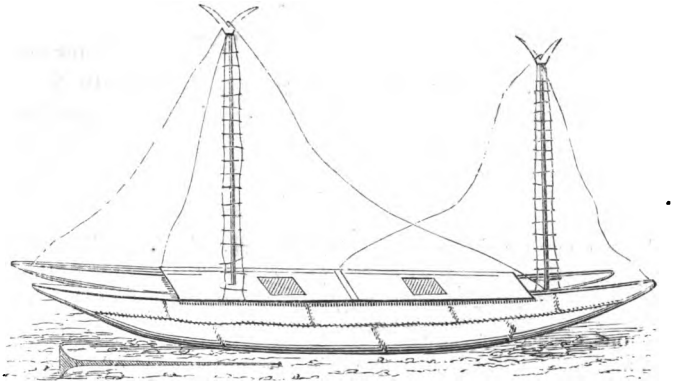

Double Canoe of the Paumota Group.

tough branches of the vine plant, and these supply the place of ropes. Each mast has a forked top-piece, in shape resembling the extended wings of a bird at the moment of alighting. Over the forked top-piece other vine ropes are placed, and by these the sails are hoisted and lowered.

The sails are made of matting and cocoa-nut fibres, and the canoe is steered with a large oar, the shape of which resembles the flat section of a straight trumpet. In these canoes the islanders undertake voyages of many miles to neighbouring lands, steering by the sun in the daytime, and by the stars at night, when out of sight of the coast.

The natives thus carry on a small trade; but these are principally the Chain Islanders, who supply themselves at Tahiti with various small articles, in exchange for their cocoa-nut oil and dried fish. (1)

Wytoohee Canoes.

The canoes of Wytoohee (one of the islands of the Paumota Group) are very small, being only from twelve to fifteen feet in length. They are built of strips of cocoa-nut wood sewn together; and when completed, these canoes are so light that two persons may carry them on their shoulders.

(1) Wilkes, vol. i.

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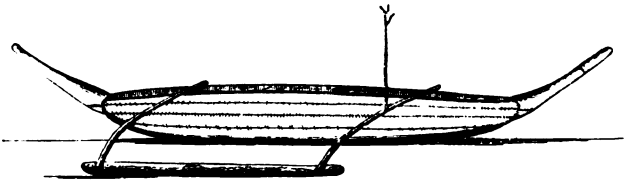

Wytoohee Canoe.

These canoes have projecting stem and stern-pieces, as shown in the engraving; and it is by aid of these projections that the natives are enabled to get into them from the water without upsetting them.

They are also provided with an outrigger of a very simple kind, but which gives additional stability to the vessel. The paddles by which they are propelled are curved backwards. (1)

BOATS OF HINDUSTAN.

Boats of every size, and as numerous in variety as those of any nation under the sun, are met with on the noble rivers and shores of Hindustan. The chief traffic of the country is carried on in boats, some of which are of symmetrical and graceful form, and capable of sailing very fast in smooth water. Those employed on the Ganges have high stems and sterns, and are well adapted to the peculiar and intricate navigation of that locality. The boats of the Ganges have necessarily a large rudder, and even that is often rendered powerless, by reason of the rapidity of the currents. Great presence of mind is sometimes necessary in the navigation of boats on the Ganges, particularly by the man at the prow, who, with surprising agility, has to dart his long bamboo pole to the opposite bank, and turn the boat, or fend off in the midst of the rapids, to prevent accidents. The boats employed between the Gulf of Cutch and the Sinde, or Indus, are chiefly bugalos, naodees, muchoos, coteyahs, and gungos.

(1) Wilkes, vol. i.

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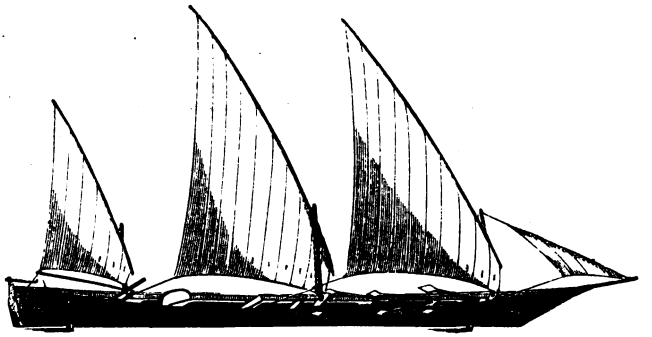

Indian Pleasure-Boat.

Almost all Indian boats have considerable rake both at stem and stern. The fastest have long, sharp, and generally hollow bows, and the stern is often as sharp and tapering as the bow; but those used for the purposes of trade have less graceful proportions.

The Indian method of construction differs from the European in many respects. Instead of nailing and clinching the planks, they are carefully rabetted together in a neat and durable manner; and although such a method occupies a vast amount of time and labour, the vessels so constructed seldom require caulking, all the seams and interstices being filled with cotton stuff, and the whole exterior served over with pitch, or other resinous substance. The wood used by the Indians in boat and ship-building is chiefly teak, which is well known as a hard, tough, and durable material.

Indian Pleasure-Boats.

Indian pleasure-boats of the class above illustrated sail very fast with a free wind, but, generally speaking, are too long and tapering for turning to windward with effect. They are usually flat and full amidships, but drawn out to great extremes at each end.

The common mode in which Indian boats are rigged is the lateen. A kind of lug-sail is also a very general form of rig in some parts.

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The style of rigging the lateens of India differs from that of the Mediterranean. The Indian lateens have seldom more than two masts, of which the hinder one is much the smaller; but some of the modern pleasure-boats have three, and a bowsprit besides. The sails, instead of being right-angled triangles, like true lateens, have the foremost angle cut off, so that they are nearer the principle of the old settee sail. A great advantage, however, is, that lateen sails so cut may be reefed at the foot with every facility, which is not generally the case with lateen sails.

Boats of the Punjaub.

The pleasure-boats of Punjaub are of a long and graceful form, but broad amidships, with a cabin or house. They are, however, very shallow, and drawn out to great length at the bows. They are decked all over, excepting the part occupied by the cabin, and they have a railing along each side of the deck. These boats are gilded, painted, and ornamented with considerable good taste.

Bombay Fishing Boats.

The Bombay fishing clippers rank among the fastest of their class in India, and are worthy of imitation in many respects. Some of them are splendid sea-boats, but not so quick in staying, nor so convenient for turning to windward in narrow channels, as the boats of some other nations. Their greatest draught of water is forward—which is the reverse of the English and American systems. They have also a very sharp and hollow bow. The breadth of beam is carried well aft, and finishes with an overhanging stern. The rig consists of two lateen sails, but no bowsprit nor sail of any kind is set beyond the stem. Both masts rake forward. The mizzen-mast is generally a trifle more than half the length of the main-mast, and the yards in the same proportion. Some of these boats measure from twenty to thirty tons, the main-yard for which is nearly a hundred feet in length. The head, or fore-leech, of the sail is of the same dimensions as the aft-leech. Neither

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shrouds nor rigging are used in these boats, the main-halliards being the only stay to the mast. The tack of the main-sail is managed with a luff-tackle purchase at the stem, in the same manner as the clew by the main-sheet, the double block being seized into the tack, and the single block strapped to the mast. In wearing, both sheet and tack are eased off; but in tacking, the sail and yard are shifted to either side of the mast without being lowered. The mast, in such case, must be rather above the yard at the slings, to allow a little play for the halliards, and must also have considerable fore-rake. (1) The manœuvre could not be performed with advantage on an upright mast.

In the International Exhibition of 1851 was a model of the Bombay yacht 'Wave.' The model was taken from a fishing boat of Bombay.

One remarkable peculiarity about this yacht is, that the keel is curved in a crescent-like form, so that the fore end is two feet lower than the level of the keel amidships, and so acts as a gripe, or lee-board—the intention being to make the boat weatherly. This vessel has a comparatively flat floor, hollow entrance, and a sharp flat run. Its length over all is forty-six feet, entrance breadth twelve feet, and depth amidships three feet eight inches. The length of the spars is as under:—

Main-mast .	36 ft. long	Mizzen-mast .	22 ft. long
Main-yard . .	65 „	Mizzen-yard .	40 „

The sails, as already stated, are of lateen shape, and made of drill, sewn in narrow cloths.

The 'Wave,' it is stated, was built as a pleasure-yacht, but more particularly for the regattas and sailing matches for which Bombay has of late years become truly famous. This yacht, when ballasted, has won many prizes. No boat of European form and construction had, up to that time (1850), been found able to compete with her successfully in point of sailing in moderate weather. (2)

(1) This method is adopted in some of the lateen boats of the Mediterranean.

(2) *Vide* Official Catalogue of the International Exhibition, 1851.

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Bombay Cotton-Boats.

These boats belong entirely to the port of Bombay. They are called cotton-boats on account of their being constantly employed in conveying cotton from the shore to ships, bound for China and Great Britain, loading with that article. They are, in fact, the only boats made use of in loading and unloading the numerous kinds of outward and inward cargoes of ships visiting the port.

They measure in length from twenty-five to thirty-five feet, and in breadth from ten to thirteen feet, and three and a half to four feet in depth. They are very roughly but strongly built, and the largest of them will carry fifteen tons of dead weight. They are also employed in bringing the produce of the Island of Salsette—such as grain, grass, vegetables, &c.—to Bombay; also for the conveyance of troops, with their baggage, to and from Panwell.

The inside of the cotton-boat is lined with bamboo matting, to protect the cargo from bilge-water. These boats are generally navigated by a crew of six men and a *tindal*—principally Mahommedans—who live in the boat.

On one side of the mast is a fireplace, and on the opposite side a cask or tank, containing fresh water. The bottom of the boat, outside, is annually, or oftener, paid over with a mixture of chunam, or lime, and vegetable oil, which hardens, and is a good protection against worms. They have one mast, which rakes forward, and a yard of the same length as the boat. The cost of one of the best of these boats, complete, is about seven hundred rupees. They are mostly hired by the day, at a rate varying from two to five rupees, according to their size and the season of the year.

Bombay Dinghy.

(*See Engraving.*)

The dinghy, dingee, or bum-boat of Bombay, is a small boat, from twelve to twenty feet in length, five to seven feet in breadth, and eighteen inches to two feet in depth. It is very similar in form and size to the cotton-boat before de-

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BOMBAY DINGHY.

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scribed, but smaller. These boats are rigged with a raking mast, lateen sail with the fore angle cut off, and a yard the same length as the boat. They are navigated by three or four men, who, very frequently, are joint-owners of the boat.

These dinghys sail very well. They are employed in carrying persons to and from vessels in the harbour. They also carry persons desirous of visiting the islands of Elephanta, Caranjah, and others in the harbour of Bombay. It is generally the practice of captains and commanders of ships to hire one by the month, at the rate of forty or fifty rupees.

Batelles of Bombay and Surat.(1)

These vessels belong principally to merchants, and are decidedly the best constructed, and best found in fittings and stores, of any kind of boat of Western India. They are built entirely of teak-wood, well planked and fastened with iron nails and bolts; they have a great rise of sheer forward, and a regular stem, with madows, abaft. Some are fitted with a cabin under the poop, but the majority of them carry bamboo decks, over beams fitted for the purpose.

They are from thirty-five to fifty feet in length, fifteen to twenty feet in breadth, and five to seven feet in depth, and from twenty-five to one hundred tons burthen.

They are rigged with lateen sails, of similar shape to those above described; and with main and mizzen-masts, both raking forward. The main-yard is a little longer than the extreme length of the boat. They are also provided with a boom or bowsprit, on which a jib is set. These vessels have a break in the top sides, from the fore part of the poop to the luff of the bow, nearly level with the beams, for the facility of taking heavy cargoes in and out. At sea, this break is stopped up with bamboo mats inside, and outside with soft mud or puddle, which renders them as water-tight as any other part of the hull. It is a remarkable fact, that no one ever hears of damage being done to the cargo from any defect in this part of the vessel, although, when the boat is fully laden, the

(1) *Vide* Official Catalogue of the International Exhibition, 1851.

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break is only about one foot or eighteen inches above water. These boats import cotton from Surat, Broach, Cambay, and other cotton-growing districts, to Bombay; and teak timber from the northern forests, which is extensively used in ship-building at Bombay.

There is a great similarity between these vessels and the Arab batelles, described and illustrated at page 324.

The Budjerow.

These boats, sometimes called Bengalee boats, are a good deal used by Europeans for travelling on the Ganges, and in various other parts of India. They have very high sterns, are full amidships, and round-bottomed. They are of various sizes, from twenty-five up to sixty feet in length. Some of the longest are rowed by as many as twenty oars, and are steered with a sweep (or large oar), extending nearly ten feet abaft the stern. They are sailed with a square-sail, and square-topsail in fine weather.

The budjerow is decked all over, throughout its whole length, with bamboo. On the deck is erected a low, light fabric of bamboo and straw, like a small cottage without a chimney. This is the cabin and baggage-room, and also the sitting and sleeping apartment for passengers; and if intended for a cooking-boat, there are one or two small ranges of brick-work, like English hot-hearths, but not rising more than a few inches above the deck, with small, round, sugar-loaf holes, like those in a lime-kiln, adapted for dressing victuals with charcoal.

The roof of the cabin being by far too fragile for men to stand upon, and as the apartment itself takes up nearly two-thirds of the vessel, upright bamboos are fixed by its side, which support a platform of the same material, immediately above the roof; on which, at the height of about six or eight feet above the surface of the water, the boatmen sit or stand to work the vessel. They have for oars long bamboos, with disc-shaped blades, a longer one of the same sort being used to steer with; a long rough bamboo for a mast; and one or

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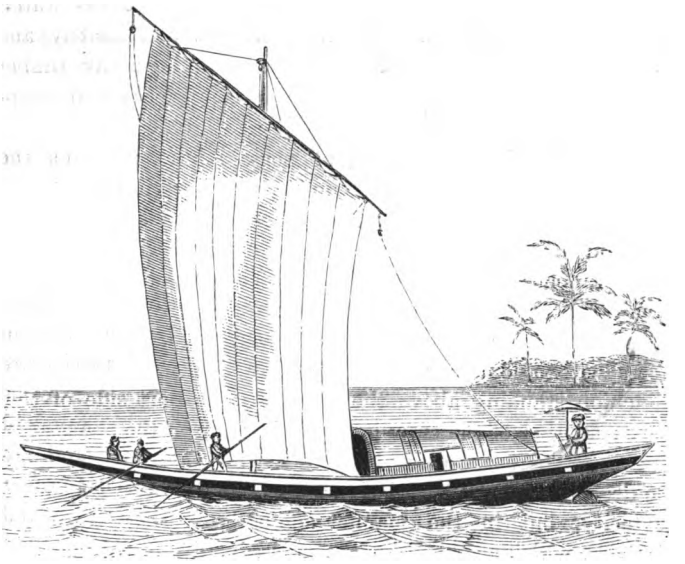

Ganges Sailing-Boat.

sometimes two sails, of a square form (or rather broader above than below), of very coarse and flimsy canvas, which is set on a bamboo yard.(1) Some of the fastest of these boats are of a somewhat superior form and construction, and have three square-sails, one above another.

With a fair wind, these vessels sail merrily over the water, though they make but slow progress with a foul wind. The English at Bengal and elsewhere have made great improvements of late years in the building or form of budjerows, by introducing a broad flat floor, square stern, and full bow; and in that form these vessels are safer and faster, and enabled to carry more sail; and being of less draught of water, they do not so often run aground. Some of them have cabins six or seven feet high, and are very commodious.(2)

(1) *Vide* Bishop Heber's 'Narrative,' vol. i. p. 84 (A.D. 1828). Forrest's 'Tour of the Ganges.'

(2) 'Voyage to the East Indies,' by J. S. Stavorinus, Esq.; translated

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A gentleman in his budjerow is usually attended by a *pulwah*, or large open boat, for the accommodation of the kitchen, and a smaller boat, called a *panchway*, for taking him ashore.

The Panchway.

The larger-sized *panchway*, or passage-boat, used on the Ganges, is a very characteristic and interesting kind of vessel; large, broad, and shaped like a snuffer-tray. It is also decked fore and aft, and the middle part is covered with a roof of palm branches, over which is lashed a coarse cloth—the whole forming an excellent shade from the sun.

The *serang*, or master, stands on the little aft-deck, and steers with a long oar, the loom of which is lashed to a stanchion standing above the deck on the port side of the stern; another of the crew has a similar oar on the starboard-quarter. There are also six rowers, who sit cross-legged on the deck upon the tilt, and ply their short paddles with much dexterity, but in the manner of oars, resting them on bamboos, which are fixed to the sides, instead of rowlocks or thowls.

When the wind is fair, they use a large long sail, of thin transparent sackcloth, in three pieces, very loosely tacked together, and secured to a bamboo yard, and also hoisted on a mast of bamboo. These singular boats are sometimes taken on very long voyages, plying from various places on the Ganges, to and from Calcutta. For ten or fifteen rupees, the boatmen will convey passengers by them a hundred miles or more.

The Bhaulea.

The Bhaulea, or Ganges boat, is very much like the budjerow. A peculiarity among many of the different forms of boats of the Ganges is the gallery, upon which light goods are carried; and the manjee, or steersman, also sits there to guide the boat, as shown in the engraving on opposite page.

from the Dutch by S. H. Wilcocke (1798). See also Forrest's 'Tour of the Ganges.'

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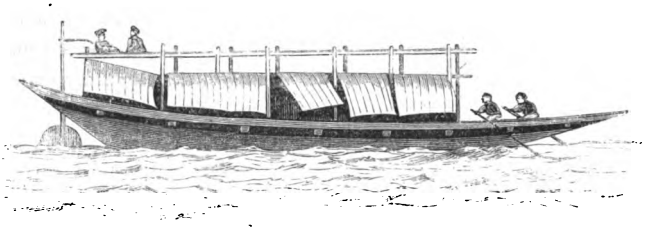

Ganges Rowing-Boat.

Cutch Cotiyahs.

These boats belong to the ports of Cutch, Mandivee, Poar Bunder, and some to Kurrachee, in the territory of Sinde. They trade between Bombay and those ports. They are very well built, with a square tuck, and many of them have a regular built stern, with ports, and are handsomely carved. Some have a deck fore and aft, but more commonly they have framework between the beams—to ship and unship, for the facility of stowage—and a bamboo deck. Their general length is from thirty to fifty feet, by twelve to twenty-three in breadth, and seven to ten feet deep.

They are navigated by a crew of fifteen to twenty men and a *tindal*. They are lateen rigged, with main and mizzen sails, both masts raking forward, to keep the ponderous yards they carry clear of the mast in lowering and hoisting.

The Pattamar.

The Pattamar or pattamach is a trading boat of Hindustan, employed by the natives of the Deccan and at Bombay for the conveyance of rice and other articles of merchandise. It is remarkable for its peculiar-shaped keel, which forms part of a circle, the hollow being directly under the midship section, where there is much less keel than at the extremities. The extent of curvature varies according to the form of the boat; those with very flat floors have the greatest curve, but in narrow and sharp-bottomed boats the curve is less. The chief advantages of a keel so formed are, that it gives to these boats additional weatherly qualities; and also that, when they get aground (as they are very liable to do in the Deccan), they

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The Pattamar.

may be got off again without difficulty. The pattamar has a hollow pointed bow, and very raking stern. It is rigged with two masts, which rake forwards, the fore-mast being the larger, as customary with Indian boats; and the main-yard is considerably longer than the boat. The pattamar is sailed under large lateen sails, and is a stiff and fast-sailing boat off wind, but not very well adapted for tacking or turning to windward.

The Muchoo,

or Muchwa, is a fishing boat of the Deccan, bearing strong resemblance to the pattamar, but is much smaller. The muchoo sails remarkably fast, even when close-hauled, but from its small size is better suited to smooth water.

Bunder Boat.

This is a stout and strongly built boat, used in and about the Indian harbours—hence the name from *bundur*, a harbour. It is generally rigged with two masts, and sailed under two lateen sails.

The Bholco.

The Bholco is a small light boat, employed in the Upper Provinces of India for the conveyance of passengers to short distances.

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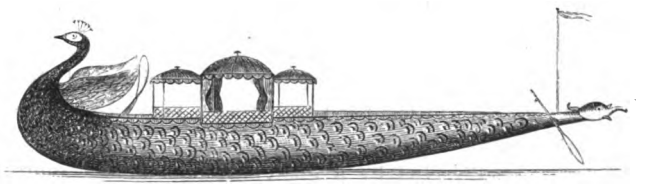
The Bugalo.

Bugalos are a useful class of boat, trading between Bombay and the Persian Gulf. They are of various sizes, have high sterns, and are usually sailed with one large triangular sail. A smaller class of bugalos are employed on the Indus.

Cheep Boats and Parinda Boats.

These are Bengal river boats—long, narrow, and shallow—with a hood or cabin abaft, and latticed deck, or raised grating, made of bamboo.



Mohr Punkee.

The Mohr punkee, or peacock-boat, is so called from its being built to resemble as nearly as possible a peacock, having at its prow a carved figure-head of that bird, with its tail extending the whole length of the boat; the plumage on each side is beautifully painted and varnished in imitation of the gaudy feathers of the peacock, and the stern finishes with the head of some ferocious animal. The extreme length of some of these boats is eighty feet and upwards, and the extreme breadth, which is towards the front, is about nine feet, from which they gradually diminish to the stern, which terminates in a point. Over the broadest part is erected a pavilion, the canopy of which is six feet high, and covered with crimson velvet richly embroidered with gold, as are also the curtains which hang on each side; the whole being supported by several varnished pillars, the lower part of which are surrounded by a light rail. A narrow balcony, extending beyond the sides of the pavilion, serves as a receptacle for confectionery, fruit, sherbet, and other refreshments.

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The floor of the pavilion is carpeted and cushioned; the occupants sitting upon it with their feet doubled under their bodies.

The throne, or seat of eminence, is in front of the pavilion, where the Nabob, or person of highest distinction, sits.

A canopy of velvet and gold is spread above the throne, and supported by pillars and the pavilion.

The boat is propelled by a crew of thirty or forty, who sit double-banked behind the pavilion, with faces fronting the direction in which the boat is to go. The paddles are each furnished with two brass rings on their handles, which, clashing and rattling together, serve to keep the rowers in time.

The boat is steered by a long oar, fastened on the larboard side, near the stern. It glides with great velocity, and draws very little water. At the head and stern a flag-staff is set up, on which streamers of crimson silk are displayed.

The crew are directed by a pilot, who stands at the prow, and generally makes use of the branch of some plant to regulate their rowing, using much gesticulation, and telling his story to excite alternately laughter and exertion. These boats belong alone to the princes and nabobs of the country. They are very expensive, owing to their great length, and the carving and costly decorations with which they are fitted.

Massoolah Boats.

The Massoolah boats (sometimes spelt Mussulah, also Masuli) are a remarkable and curious kind of surf boat, employed on the coast of Madras for beaching and putting off in the surf to ships when at anchor in the roads there. The exposed nature of the coast at Madras, the entire absence of any harbour or shelter, and the heavy broken seas which constantly prevail there, render it difficult, and sometimes impossible, to effect a safe landing of either passengers or goods in any boat of ordinary construction. Under these circumstances, the ingenuity of the native beachmen has been turned to the subject, and the result is, that they have succeeded in contriving a boat which, though of grotesque appearance and curious

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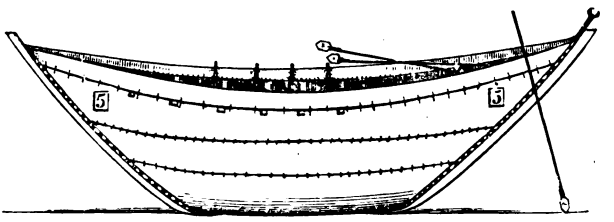

Massoolan Boat.

construction, is peculiarly adapted to meet these difficulties, so that passengers and goods may now be safely put off or landed through the heavy surf and broken water on that perilous coast. (See the engraving above.) Neither nails, pegs, nor bolts, are used in any part of the structure of a Massoolah boat, but the planks and other parts are sewn and laced together with the strong fibres of the cocoa-nut tree, layers of cotton being placed between the planks. Over the seams, inside, a flat narrow strip of tough fibrous wood is laid – the whole being then drawn tightly together with cordage; and the planks are joined to stout stem and stern-posts in the same manner. The object in building them in this manner is, to avoid the effect of the severe thumping and bumping they have to encounter on the shore, when being beached or launched through the heavy surfs at Madras, which it is impossible to avoid; so that, if fastened with iron nails or bolts, this kind of rough usage would very quickly loosen the planks, the boat would become leaky, and in the course of a very few trips would be a perfect wreck.

The Massoolah boat, however, remains for a long time almost as uninjured from the thumping and bumping as if made of leather. The wood of which it is composed being tough and flexible, the fastenings of an elastic nature, and the material that is interwoven between the planks being soft, all tend to resist with yielding effect the force and power of the surf by which the boat is dashed and thumped upon the beach.

In course of time the fibrous lashings and fastenings of the planks decay and become loose; the seams are then re-sewn

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with new material of the same kind, and fresh layers of soft cotton are introduced between the planks; and when all is completed, the boat is as good as new.

In shape, the Massoolah boat resembles no other. It is flat-bottomed, but has very high flaring sides, so that the top of the boat is considerably broader and longer than the bottom; the stem and stern are of course very sloping from the top to the bottom, as the upper part of the boat is more than twice the length of the lower part.

The Massoolah boat varies in size, though not in form. It is always very high at the sides and deep inside, very broad at the top, in proportion to its length and the small size of the bottom; and as regards the external appearance of the boat, that is, upon the whole, its greatest peculiarity.

An elevated rowlock is fixed at the stern, so as to give a leverage for twisting the boat on any sudden emergency. The steersman stands on a sort of deck at the stern, and guides the Massoolah boat with a paddle or pole, which has a circular blade at the lower end, about a foot or foot and half in diameter. A good deal of courage and nerve are requisite in the steersman of a Massoolah boat. It is rowed by six oarsmen, who sit facing the prow, and row double-banked, i. e. two on a thwart. The passengers sit aft, on a bench not so elevated as the seats of the rowers.

Notwithstanding all these precautions, there is sometimes a good deal of risk in landing on the beach at Madras; but the Massoolah boats are considered the safest form of vessel that can be used for the purpose. There is also the same risk when putting off from the beach; indeed, the launching of the Massoolah boat is an art only to be acquired by constant practice. The naked and hardy mariners who effect it cannot always, with all their expertness, prevent the water from breaking over the boat and drenching the passengers to the skin. (1)

Massoolah boats are all required to carry their numbers distinctly painted on each bow.

(1) Colonel Napier's 'Wild Sports of Asia' (1844). Hall's 'Fragments of Voyages and Travels,' &c.

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Madras Catamarans.

Strangers, on visiting the coast of Coromandel, are generally much amused with these remarkable and fragile-looking rafts, and the manner in which they breast the heavy breakers at Madras. These breakers, though nothing very formidable to look at, are irresistible in their force.

The catamarans of Madras are formed of three logs of the cocoa-tree—not rounded logs, but shaped and roughly levelled on the upper side. The length of the raft is from twenty to twenty-five feet, and the breadth two and a half to three and a half feet; the logs are secured together by being lashed to three spreaders or cross-pieces. The centre log of the three is much the largest, and is fitted with a stem-piece, having a curved surface at the fore end, which turns upwards to a point. The two side logs are similar in form, but smaller, having their sides straight, and fitted to the centre log.

These well-known floats are generally navigated by two men, though sometimes by one only; but with the greatest skill and dexterity, as they think nothing of passing through the heaviest surfs at Madras and at other parts of the coast, when the boats of the country could not live on the waves. (1)

These catamarans are used chiefly for conveying letters, messages, &c., to and from ships in the roads at Madras; and when first seen at a distance, the men appear as if they were treading or kneeling upon the water, performing evolutions with a racket, and bobbing about in the surf. (2) They carry letters in their skull-caps, which are of conical shape, and tied and waxed to their heads. These caps ease the force of the heavy breakers, under which they are often obliged to dive their heads. Sometimes they appear completely buried in the surf, which is constantly breaking over them; notwithstanding which, they are seldom known to be lost or swept from the

(1) 'Exhibition Catalogue, 1851,' vol. ii. p. 909.

(2) In the log-book of one of the early Indian voyagers is the following entry, made whilst lying off in the roads at Madras:—'This morning, six a.m., saw distinctly two black devils playing at single-stick. We watched those infernal imps above an hour, when they were lost in the distance. Surely this doth portend some great tempest!'

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raft, although they frequently venture out to sea many miles from the shore. But if they chance to be washed off by a heavy sea, woe betide them! for sharks abound on that coast. But even then the case is not quite hopeless, since the shark can only attack them from an undermost position, and by first turning on his back; a rapid dive, therefore, if not in very deep water, will sometimes save the life of an active swimmer. If the catamaran-man be lucky enough to escape the voracious jaws of the shark, he quickly regains his position on the raft, and, generally, without losing his paddle, an instrument the catamaran-men use with singular dexterity. When they come ashore, the raft is untied, and the logs left on the beach to dry. (1)

Madras Fishing Catamarans.

The Fishing Catamarans employed on the coast of Coromandel are complete skimming-dishes, but of superior and ingenious contrivance, as may be seen from the engraving on opposite page. They are larger than those last described, but possessing the same buoyant and life-boat qualities, being composed of four logs of wood, flattened on the top, and rounded at the bottom. The two centre legs are the longest, the whole neatly shaped, and, when fastened together with lashings in the usual way, forming a catamaran of graceful form and powerful bearings. The outer edges of the side logs are higher than the insides, so that a gradual slope is formed from the sides to the centre surface, and thereby a hollow is made on the top of the raft, which is, nevertheless, even more shallow than a kitchen dripping-pan. There is a gradual rise at the fore part of the raft, and the same at the aft part, and the logs are shaped so as to be light at the fore ends, but heavier and thicker aft.

A rope or wire is fastened at one end to the stem of the catamaran, and at the other end to the lashings at the stern, so that it leads straight up the middle of the raft. This rope is used by the crew for holding on by in a heavy sea, and for securing the fish, fishing-tackle, and other gear, on board the

(1) 'Letters from Madras,' by a Lady (1846). 'Voyages and Travels,' &c.

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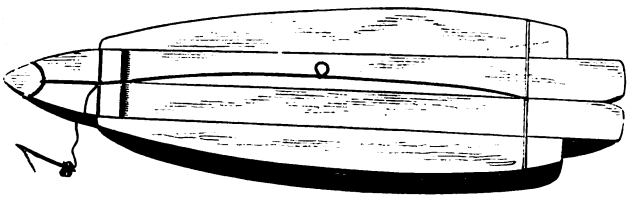

Madras Fishing Catamaran.

catamaran, and to prevent their being washed off by a heavy sea.

A wooden anchor, with a heavy stone for the shank, is still, as it has always been, the primitive contrivance used for anchoring the catamaran.

On these shallow but buoyant contrivances the native fishermen of the coast put to sea, and pursue their daily avocations with every confidence in their craft; beaching and putting off in broken water and heavy breakers without fear or danger, so long as they can retain a hold or footing upon the surface of their raft.

Ceylon Catamarans.

The Catamarans of Ceylon are nearly identical with those of Madras. The Ceylon catamaran, however, has no separate stem-piece, but the middle log itself inclines upwards at the fore end and forms a sort of stem. The side logs, too, are rather wider and more substantial than those of the Madras raft. The Ceylon catamaran is employed in the same kind of service, and answers the same purpose, as a Madras catamaran. (See also 'Sailing-Canoes of Ceylon' described at page 317.)

Madras Sailing-Catamarans.

The Madras Sailing-catamarans are of a very superior kind, composed of three carefully-shaped solid logs of wood, turning up at each end with considerable sheer. Each log is flat on the upper side, but rounded at the bottom; the fore ends are also rounded, the stern ends are flat. The middle log, which is much the largest, is placed lower than those at the sides, and

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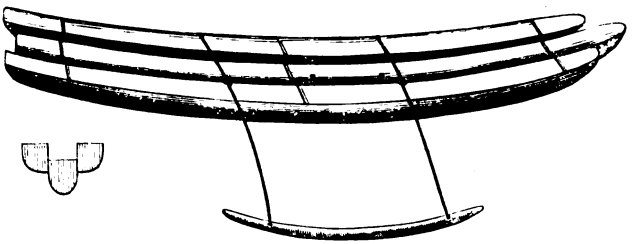

Madras Sailing-Catamaran.

hangs down like a round-shaped kelson (see the engraving and section); the two other logs, therefore, form sides and seats for the crew of the raft, and the lower one a sort of well or interior, and place for the feet of the crew. The three logs are held together by three cross-pieces, firmly secured upon the upper surface of the logs, besides which they are bolted together: and, upon the whole, form a very pretty and graceful-looking raft, of narrow form, apparently much too narrow to carry sail without some artificial contrivance; and therefore an outrigger is attached to the catamaran on one side, with a heavy solid log, neatly shaped and smoothed in the form of a long narrow boat.

These beautiful and ingeniously contrived catamarans sail remarkably fast, and will hold a course to windward equal to that of a vessel with a deep keel. The natives fearlessly venture out to sea upon them many miles, and seem to regard strong winds as ordinary weather; their catamaran being a life-boat in principle, they have no fear of its foundering.

The Langady.

The Langady, or native ferry-boat of Nursapore, is somewhat curious, as will be seen by the engraving. It is a twin boat, made from the trunks of Palmyra trees. Both trunks are quite hollow inside, and have a slit or opening at the top for passengers and goods. The stern ends are fitted with circular pieces, like the head of a cask. Two or three poles are lashed across the head part, to hold them at a proper

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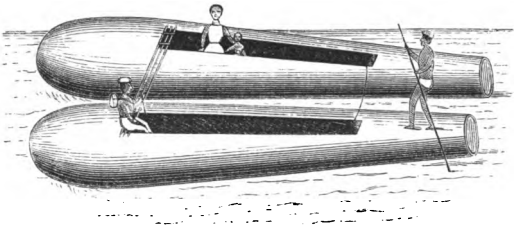

The Langady.

distance apart; at the stern they are merely held together by a rope. The ferryman stands on the aft part of one of the pontoons, and conducts and propels the langady with a setting pole, in the manner represented by the engraving.

The Dhoney.

The Dhoney or Yatrawe is one of the largest kind of trading vessels of Ceylon; it is employed in the conveyance of merchandise to various parts of the Indian Archipelago. It is from sixty to sixty-five feet in length, by nineteen or twenty in breadth, and nine or ten feet deep inside, from the arched deck to the bottom. No nails or pegs are used in the construction of these vessels; but the planking is neatly and mechanically joined and secured with lacings, made of a strong fibrous material called coir yarn. A caulking of soft matting stuff is also ingeniously laid over and interwoven between the seams, so as to make them water-tight. The hull of the dhoney is wide at the top, and sharp below, somewhat resembling a Norway yawl, only with rather less curve amidships, and less rise at bow and stern; but they have considerable rake both fore and aft, and are sharper at the stern than at the stem. The top of the cabin or hold is formed of bamboo canes, but the deck is wood. Several cross-beams or spars are placed across the vessel under the gunwale and deck, fore and aft, to the projecting ends of which the shrouds, sheets, and tacks of the sails are made fast. These dhoneys are fast-sailing vessels, and are usually fitted with

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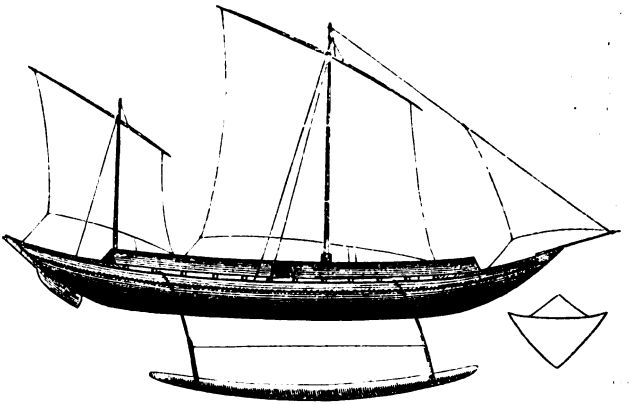

The Dhoney.

shifting outriggers, suspended and fitted in the same manner as the outriggers of other Ceylon boats. (1)

The Dhoney is rigged with two masts and three sails—main-sail, fore-sail, and mizzen; the main and mizzen sails are a sort of lug-sail, the mizzen being the smaller of the two. The masts are fitted at the heel with a pin, so that they may be struck when required. The bowsprit is short, and points upwards, or in line with the rise of the bow. They have wooden anchors, like the Malays, and are, upon the whole, a curious and primitive-looking craft.

The dhoneys of Jafnapatam are differently constructed to those of Ceylon, being fastened with nails and iron bolts, and they have no outrigger, and therefore carry smaller sails.

Dhoneys of the Cavery, in Mysore.

The Ferry-boats on this large river are called 'donies' or dhoneys. They are merely baskets, of a circular form, eight or ten feet in diameter, covered with leather. In fact, they

(1) Sir Emerson Tennent, in his work on Ceylon, says:—'The Singhalese dhoney, south of Colombo, is but an enlargement of the Galle canoe, with its outrigger so clumsily constructed that the gunwale is frequently topped by a line of wicker-work smeared with clay, to protect the deck from the wash of the sea.

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are coracles, as regards the materials of which they are composed, but differing in shape to the coracles of Great Britain. (1)

In these fragile vessels, men and women, goods and merchandise, are transported with tolerable safety.

The Balham.

The Balham, or ballam, is a kind of canoe belonging to the estuaries and shallow lakes around the northern coast of Ceylon. It is made by carving and hollowing out the trunk of a single tree of enormous size, and is the largest description of boat so constructed. The balham has a deck or covered compartment fore and aft, and is chiefly employed in carrying rice to different parts of Ceylon. It is rigged with a single sail, of square shape.

Sailing-Canoes of Ceylon.

'Sometimes swiftly as swallow blithe
Skimming the ocean's breast,
Sometimes sleeping with folded sail
In calm and dreamy rest;
Their cordage fine, in the white moonshine,
All "beauteously confest."'

Captain G. P. Thomas.

The Ceylonese (also called Singhalese) or Point de Galle canoes are very remarkable, not only for their curious and ingenious form of hull, but also as regards the manner in which they are rigged and sailed. (See the engraving on next page.) They are sometimes called double canoes, though one portion is merely a balance-log, carried to the extremity of two flexible outriggers, each eighteen feet long. They have always been made without nails; and although such was the practice in the remotest period, it is retained to the present day. (2)

These extraordinary little vessels are life-boats in principle. They carry no ballast, but their peculiarly buoyant nature and ingenious form of construction enables them, under the skilful

(1) *Ante*, page 22.
(2) Sir Emerson Tennent's 'Ceylon,' vol. ii.

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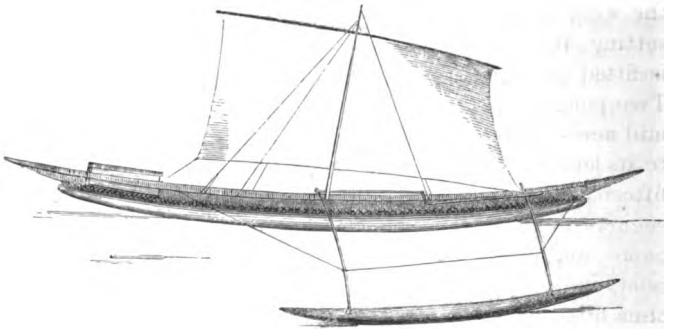

Sailing-Canoe of Ceylon.

handling of the natives, to be as safe a kind of boat as any in which to venture out to sea in those parts. Their dimensions are from eighteen to thirty feet in length, by only two and a half in breadth, and from two to three feet deep, exclusive of the wash-boards, which are from ten to eighteen inches deep, and sewn to the gunwale with coir yarns, loose coir padding being bound over the seams or joinings.

The hull is formed from the trunk or a single stem of the doop-wood, or pine-varnish tree, hollowed and smoothed in the usual way, but not left so open at the top as in other canoes, the hollowed trunk being more like a cylinder, with a narrow strip about eight or ten inches wide, cut out of it from end to end. The leeward side of some of these canoes is bow-shaped in the longitudinal form, though, in other respects, inclining to flatness; but the weather side is fuller and rounder, and in this respect they are something like the flying proa of the Ladrone Islands. (1) Upon the cylindrical part of the Ceylonese canoe they build a sort of trough, extending from one end to the other. The cylindrical, or bottom part of the canoe, turns up at each end, so also the trough-like or top part. The latter also projects two or three feet beyond the cylinder at each end, so that the stem and stern of the canoe stand high above the water. The flat sides of the top part, standing up

(1) *Ante*, page 242.

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above the cylinder, considerably add to the ticklish nature of the whole fabric; but in order to prevent the canoe from oversetting, and to preserve its stability on the water, an outrigger is fitted on one side of the canoe in the following manner:—Two poles or spars, curved downwards at the outer ends, are laid across the gunwale or trough of the canoe, at right angles to its length, and projecting from the weather side some twelve, fifteen, or twenty feet, where the outer ends of the poles are secured to a log of buoyant wood, about half the length of the canoe, and placed parallel with it, the log being shaped as a boat, and sharpened and turned up at each end. The outrigger, thus fitted, acts as a powerful lever to the canoe, and preserves its stability under great pressure of sail. The mast is stepped exactly amidships, and secured by shrouds extending from the mast-head to the gunwales. The canoe is sailed under a large square-sail, the yard of which is slung precisely in the middle, the tack of the sail being made fast in the bows of the canoe, and the clew held by a main-sheet, which hauls from the stern.

The sail of the canoe is generally so large in proportion to the size and breadth of the hull, that the tall slender mast has to be further protected with back-stays. A shroud or stay is also fastened to the outrigger, and secured to the top of the mast. The mast is thus well supported, but not more so than is necessary for so wide a spread of canvas.

On tacking or putting about, they do not turn the boat, but merely make the tack of the sail the clew, and *vice versâ*. The stern then becomes the prow, and thus the outrigger remains on the windward side of the canoe.

In a strong breeze, one or two of the crew walk out to the extremity of the outrigger, keeping their footing on the spars, and holding on by a man-rope, which is purposely fixed about breast-high to the mast, and in this manner the extra pressure of the wind is counterpoised.

Flanging seats, or thwarts, resting upon cross-pieces, are sewn to the top sides aft of the canoe, so that the crew sit out beyond the sides or wash-boards, and facing each other, their legs hanging down in the trough, or interior, of the canoe.

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These narrow and fragile-looking boats are managed by half-clad natives, who venture out to sea with them distances of twenty miles or more from land—for a Cingalese canoe will live at sea in any weather—and they skim along among the shipping at Point de Galle with fearless velocity, bringing up now and then to offer for sale beautiful, but unfamiliar fruits, and fishes of extraordinary colours and fantastic forms. (1)

Vessels passing the southern coast of Ceylon are generally boarded by these boats, even at the distance of twenty-five miles from the shore. These canoes are of various sizes, some much shorter than others, but all upon the same principle of construction.

They will sail at the rate of ten miles an hour in strong winds, which are generally prevalent there, and, with a crew of five men, carry a cargo of vegetables. The latter are great luxuries to the crew and passengers of a ship, after a long voyage from England to Bombay or Bengal, and are therefore willingly purchased of these venturesome canoemen.

Major Forbes, in his 'Eleven Years in Ceylon,' (2) describes the outrigger in these canoes as being always placed to *leeward*, which would seem to be in direct contradiction to all other authorities as to the outrigger being to *windward*. The gallant Major thus describes the native canoe:—'From Chilaw I procured a canoe which conveyed me with great speed to Colombo, bounding over the waves without any of that jumbling motion which has caused me to feel, in every other kind of vessel, so very uncomfortable. These canoes are of a very peculiar construction, the principal part consisting of a long tree hollowed out. On this a high mast, and still higher sail, appear quite disproportioned to the vessel, which is prevented from being upset by a log of wood, called the outrigger. This is a sort of miniature of the canoe, only it is solid, and is attached and kept parallel to the canoe by means of two curved elastic sticks. The outrigger is always to leeward, and, as both ends of the canoe are shaped alike, the

(1) Sir Emerson Tennent's 'Ceylon,' vol. ii.

(2) Vol. i. p. 269.

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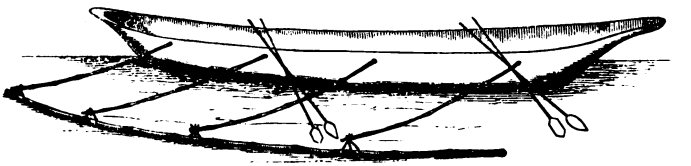
change of direction is accomplished with little delay, by simply shifting the sail, and proceeding with the former stern as its head. The motion of these canoes somewhat resembles a horse in full gallop; and if the outrigger is well secured, they are able to keep the sea in ordinary weather, which could hardly be expected, judging from their simple form and skeleton-like appearance.'



CANOE OF THE ANDAMAN ISLANDERS.

'This happy bark is from Eastern isles,
Where the loving sun doth shed
Warm kissing glances, where they lie,
Beauties on ocean's bed.'

CAPTAIN G. P. THOMAS.

THE Andaman Archipelago is a group of small islands in the Bay of Bengal, the largest of which is the Great Andaman. 'The surrounding waters are studded with numerous small islets, many of them exceedingly pretty and picturesque in appearance, rising as they do like beautiful oases in the wild waste of ocean that lashes their rocky shores.' (1)

'The inhabitants of the Andamans have always been considered one of the most savage races on the face of the earth, whom civilization has yet found it impossible to tame, or, as it appears, even to approach.' (2)

But notwithstanding their uncivilized nature, the Mincopie, or natives of the Andaman Islands, possess very ingeniously constructed canoes, scooped out of the solid trunk of a single

(1) 'The Andaman Islanders,' by F. J. Mouat, M.D., &c., &c., (1863).
(2) Ibid.

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large tree. In shape they are long, narrow, and gracefully formed. They are also fitted with an outrigger, for the purpose of steadying them when at sea. The manner in which they are constructed is rather peculiar. The natives select one of the finest trees of the forests, that with the longest, thickest, and straightest trunk being, of course, preferred. As the implements they possess for felling are not of the most effective description, the process of bringing down one of these gigantic trees is one that requires a considerable amount of exertion—sometimes a week's labour.

The next operation is to round the trunk, a process they perform with remarkable dexterity, it being almost impossible to conceive how, with the imperfect instruments at their command, they execute their work with so much skill and neatness.

As soon as the trunk has been rounded, they commence the operation of cutting and chipping at it externally, until eventually the outlines of the elegant canoe begin to appear from the shapeless mass of the knotted trunk, just as, by the skill of the statuary, the beautiful figure gradually assumes its fair proportions in the block of marble. The shape externally is generally finished with great care and elaboration, before they proceed to hollow it out internally. (1)

The interior is excavated in the same perfect and business-like manner, until the shell is no thicker than the sides of a deal bonnet-box, although it still preserves that strength which would enable it to resist the force and violence of the waves.

'The buoyancy of these boats, when they are well constructed and carefully finished, is remarkable. They float lightly on the top of the waves; and unless they have received some injury, it is considered almost impossible to sink them. They would make most excellent life-boats—such, we believe, as have never yet been constructed by any of our most experienced boat-builders.' (2)

When the Mincopie go to sea in these canoes, they attach to some part of the boat an outrigger, in some respects resem-

(1) 'The Andaman Islanders,' 315 *et seq.*. (2) Ibid. p. 317 *et seq.*

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bling that which the Cingalese fishermen attach to their boats. The use of this outrigger must be a thing of comparatively recent practice among the Mincopie, for no former writers have ever alluded to them. Dr. Mouat suggests the probability that during one of the monsoons a Cingalese outrigger-boat may have been drifted on to the beach of one of the Andaman Islands, and the natives may have thereby acquired the notion. (1)

These outriggers enable them to proceed in safety to sea to more distant fishing grounds.

'We have often seen them far out on the ocean at the midnight hour, the pine torches which they light at such times blazing luridly, and in that distant sea presenting a very curious and romantic spectacle, reminding us of the mode of salmon-fishing by "burning the water" in the rivers at home.' (2)

The paddles are extremely well made of a hard-grained wood, the smallest about three feet long, the middle-sized three and a half feet, and the largest four feet. The work of making them is entrusted solely to the native women and children.

'With the assistance of these simple, but well-shaped paddles, these canoes are propelled at such a rate that, in a fair race with an English ship's boat (the captain's gig), rowed by a prize crew of Chinese and others, the gig was completely distanced by the canoe, and all attempts to recover a fair position in the race were found to be entirely unavailing. The gig and crew appeared to have no chance with the Mincopie.'

'Our first cutter also had a trial with the Mincopie boat, but her desperate efforts to win back our character for unsurpassed speed were hopeless. The Mincopie were superior, and had it all their own way.' (3)

(1) 'The Andaman Islanders,' p. 317 *et seq.*
(2) Ibid.
(3) Ibid. p. 320

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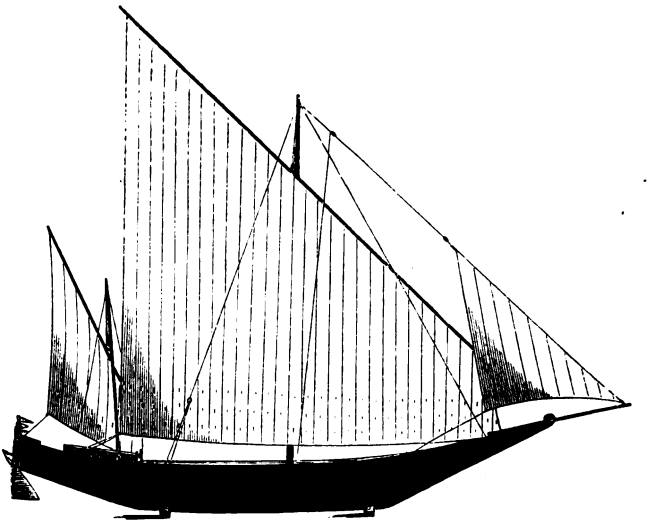
ARABIA.



ARAB BATELLES.

ARAB batelles were the boats principally used by the Joaseme pirates of the Persian Gulf, who, in years gone by, were a terror to the native mariners, until exterminated by the united efforts of the King's ships and the Honourable East India Company's vessels-of-war. They were very destructive to trade, because no vessel could escape them; and their weatherly qualities prevented square-rigged ships from capturing them, except in strong breezes. But their fame has now passed away by the introduction of steamers, previous to which it is said, 'there was no vessel ever built that could sail so close to the wind.' (1)

It is also stated that when the pirates on board were supposed to be on the point of surrendering, they used to make off with the batelle in gallant style within gun-shot of the ship, and were chased and pursued in vain.

(1) Official Catalogue, International Exhibition, 1851.

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Batelles have very raking bows and stern, the latter inclining upwards in a most peculiar manner from the keel (see engraving); and the rudder, consequently, hangs lower than the under part of the stern.

These vessels are exceedingly well built, upon scientific lines; they have good beam, a very sharp and hollow floor, very clean run, and a perfectly wedge-like entrance, which offers little or no resistance to the water.

To the aft part of the rudder on the outside is affixed the tiller, which has a curve, pointing upwards. The yoke-lines attached to it are led inboard by means of an outrigger at the side; with these the helmsman steers the batelle. The rudder requires very little head, as, indeed, it is confined to a certain point by spreaders nailed to the stern-posts.

These batelles are lateen rigged, and have three suits of sails, made of very fine cotton canvas, woven by hand at Bahrein. In calms, they are propelled by sweeps or long oars. The largest size batelle is 150 tons, and now used only by the Arab chiefs of the Persian Gulf on state occasions and visits of ceremony. The main-yard of the batelle is longer than the vessel itself, and the sails are very large and pointed.

The lateen sails of the batelle are so made that they are not what are termed true lateens, because they have the fore angle cut off, the advantages of which are, that the sails so cut may be reefed at the foot, or lower part (which is not generally the case with lateen sails), and a much shorter yard only is required for setting the sail.

The same kind of lateen sail (with the fore angle cut off) is used for the pleasure-boats and other vessels in various parts of India, by reason of the facility it affords for reefing. When close-reefed, the sail presents a true lateen appearance.

A beautiful model of one of these remarkable vessels was exhibited in the International Exhibition of 1851. This model, from which the engraving on opposite page was made, is now in the Indian Museum, and is considered perfect in every respect, as a whole; and as to the details, the making of it is said to have been superintended by an Arab from the Persian Gulf. (See also 'Batelles of Bombay,' *ante*, page 301.)

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BERMUDIAN BOATS.

'Where the remote Bermudas ride,
In the ocean's bosom unespied.'

A. Marvell.

The Bermudas, or Summer Islands, although mere specks on the map of the wide Atlantic Ocean, have many interesting circumstances connected with their history—

'Those leafy islets on the ocean thrown,
Like studs of emerald on a silver zone.'

It was at Bermuda Tom Moore wrote many of his most beautiful poems, during the time he there held a Government appointment. There, also, the lofty cedar thrives in luxuriant moisture, whilst the clear blue waters of the ocean dash their hissing foam against the rocky shores and coral reefs of the coast.

'Nothing can be more romantic than the little harbour of St. George's. The number of beautiful islets, the singular clearness of the water, and the animated play of the graceful little boats—gliding for ever between the islands, and seeming to sail from one cedar grove into another—formed altogether as lovely a miniature of Nature's beauties as can well be imagined.' (1)

'The morn was lovely, every wave was still,
When the first perfume of a cedar hill
Sweetly awak'd us, and with smiling charms
The fairy harbour woo'd us to its arms.' (2)

The navigation of Bermuda, with its hundred and fifty islets, is very intricate and dangerous; but the natives have acquired a world-wide fame for their sailing-boats, which are of a superior form and beautiful rig, and possess great powers of sailing to windward. It has often been questioned whether the Bermudian rig is not the most effective in the world for sailing to windward. The schooner rig was formerly the favourite with those islanders, and up to the present day

(1) T. Moore, in note to a poem written at Bermuda.
(2) T. Moore.

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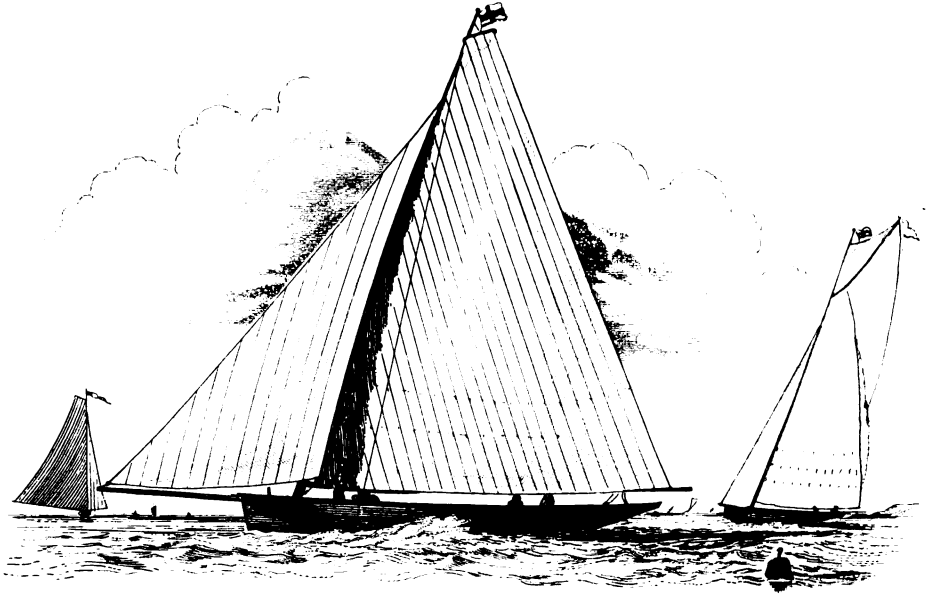

BERMUDIAN BOATS.

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some of the Bermudian boats are rigged with two masts; but the most powerful rig consists of one mast only, as shown in the engraving opposite.

The Bermudian boats are built chiefly of the native cedar, as are also many large vessels belonging to the islands. The 'Driver' sloop-of-war, in which the English poet was conveyed to Bermuda, is described as a 'vessel built of cedar.'

Most of the open Bermudian boats are protected by a deck, or water-way, about eighteen inches wide, which extends from the galley or forecastle to the stern; the larger ones are decked all over. They have a very deep keel and deep form of hull; short and wide on deck, with immense fore-gripe and aft dead-wood.

The Bermudians are particularly skilful in the management of their boats, and also in cutting and fitting the triangular sail. The present rig was introduced among them, many years ago, by an experienced boat-sailor, the Honourable H. G. Hunt, who, having lost a schooner race for a large sum, had an impression that the one mast would have a decided advantage over the schooner rig. He therefore challenged his antagonist to another race for a similar wager; meanwhile he secretly proved the superiority of the single main-sail by a private race with a schooner at midnight, and on the following day was eminently victorious in a public sailing match. From that period, the chosen rig of the Bermudian boatmen has been that with one mast only. Boat-racing became a favourite amusement with the islanders; and a first-rate boat-sailor was a *sine quâ non*. A yacht club was established, and yacht-racing afterwards became general, and was looked forward to from time to time with as much interest as horse-racing is in England. Boats were constructed exclusively with regard to speed; the cedar bottoms were polished, so as to present the smoothest possible surface to the water; and the boats had neither gunwale nor cabin, nor even bulk-heads. The deck was of convex form, and made of the lightest wood, just strong enough to bear the weight of one or two of the crew. Such consummate skill was displayed in the construction of the hull and the cut and fit of the sail, that, with

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the exquisite seamanship of a well disciplined racing crew, a boat of thirteen feet in length, upon the improved plan, would beat one of the old-fashioned form of twenty-five, in fair ordinary weather.

The mast of the Bermudian boat is spiral—a beautiful tapering spar, of white spruce, placed very far forward; so much so that the heel is stepped into the lower part of the stem-piece, with considerable aft rake. A single shroud on each side bears the extra pressure of the canvas, and is secured within a few feet of the mast-head: from the same berth the jib-halliards are rove through a tackle. The main-sail is triangular, or nearly so; and there being no gaff to sway the sail to leeward, and only one other sail before the mast, the great spread of canvas abaft enables the boat, when properly handled, to go within three points of the wind in ordinary trim, and, when well equipped and judiciously ballasted, will work within the seven points. A topsail is occasionally used when going free in very fine weather; it is of different shape, and set in a different manner to anything of the kind used for other boats (see engraving which faces page 327); a large square-sail is also used when running directly before the wind in a race.

A model of the Bermudian yacht 'Undine' was exhibited by Lieut. Taylor, of the 39th Regt., in the International Exhibition of 1862.

There is also in the United Service Museum, London, a model of a celebrated Bermudian boat, the 'Lady Ussher,' of fifteen tons, presented by Mr. Triscott, the dimensions of which are stated as under:—

Length of keel	24 feet
,, over all	32 ,,
Breadth of beam	12 ,,
Draught of water	8 ,,
Length of mast	64 ,,
Hoist of main-sail	56 ,,

It will thus be seen that these boats have considerable breadth of beam, in proportion to length, which is necessary to enable them to carry the lofty mast required to spread the peculiar and graceful-looking triangular main-sail.

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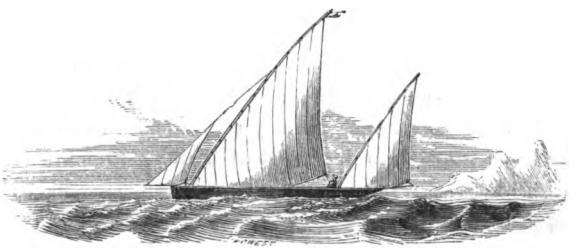
The boom, in some of the boats, extends considerably abaft the taffrail; the fore-sail extends to the end of the standing bowsprit; and they have generally a jib-boom besides.

Much of the success of a Bermudian boat depends on the experience and skill of the crew, and there are no boats so useless in the hands of persons who are not accustomed to their peculiarities; hence there is great difficulty in affording them a chance in the English matches, added to the circumstance of our races being generally *round a course*, and not, as in Bermuda, dead to windward and leeward, which are the two most advantageous courses for these boats.

When a boat is entered for a race at Bermuda, there is no restriction as to sails, the owner being at full liberty to put any canvas upon her, or prepare her in any way he may think proper; but only two sails are used to windward, and a square-sail to leeward. In ordinary trim they have main-sail, fore-sail, jib, gaff-topsail, and square-sail. The stake-boats are placed dead to windward and leeward, and the start takes place from the latter, so that the racing boats are sure to start on even terms.

The Bermudian rig ought not to be extended to vessels above eighteen tons, because any mast fit to carry a proportionate area of canvas would be too ponderous for its position. It is unquestionably a superior mode of rig, and, if not one of the fastest in the world, is considered as unequalled for working to windward in smooth water; but in a sea-way the lofty peak is not so effective. These boats are said to sail nearer the wind than cutters; this, and the quickness with which they tack, would seem to make up for any deficiency of speed on a bowline.



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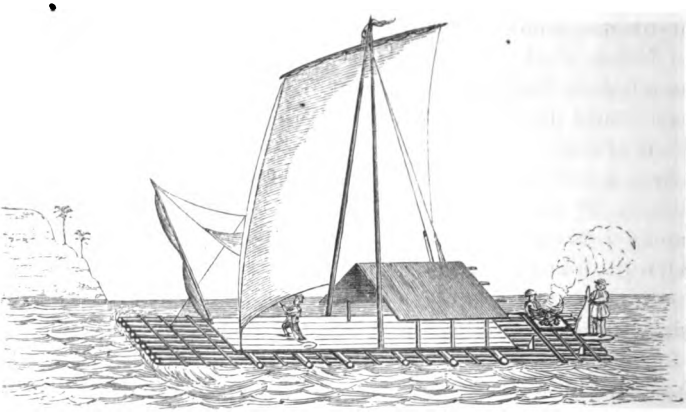
SOUTH AMERICA.



South American Sailing-Balza.

The Balza, or Balsa, signifies a South American raft, composed of five, seven, or nine logs of wood, or trunks of trees, called balza. The natives of Darien call the tree puero. The balza is a soft, whitish wood, and very light.

Balzas are not only used on rivers, but short sea-voyages are made in them.

They are of various kinds. Some are fishing balzas; some are used for carrying all kinds of goods from the custom-house to Guayaquil, and from thence to Puna, the Saltode Tumbez, and Paita; and others, of a more curious and elegant construction, are employed in removing families to their estates and country houses.

Some of these are formed of very large trees or trunks, two or two and a half feet in diameter, and from sixty to seventy feet in length. The trunks are fastened or lashed together with bejucos (or withes); and so securely that, with the cross-pieces, or smaller logs, which are also lashed with all possible strength, they resist the rapidity of the currents and heavy seas in their voyages to the coast of Tumbez and Paita. The width of the raft varies from fifteen to thirty feet and upwards, according to the size of the logs.

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The thickest and largest of the trunks which compose the balza is also the longest or middle one, so that it projects beyond the others; and to this are firmly lashed the first trunks right and left on each side, and so on, successively, the others, till the whole are secured—that in the middle being the principal piece; and thus the balza is always composed of an odd number of trunks.

Across the main trunks, and in addition to the cross-pieces, are four, six, or more short trunks, of nearly the same size in diameter as the others, but of a length corresponding with the width of the balza; and over these, again, are placed, longitudinally, flat boards or planks—forming a raised platform, with a dry and level surface.

The balza, so constructed, is rigged with a double or shear-mast, composed of two poles of mangrove-wood, the lower ends of which span the platform from right to left, and the upper ends are lashed or fastened together. From the shear-mast, so erected, a main or square-sail is suspended. Those which carry a fore-sail have an extra shear-mast, composed of two smaller poles, which are set up in the fore part of the raft, in the same manner as the main-mast.

Over the aft part of the platform, abaft the main-mast, a strong tilt is erected, formed of reeds.

Abaft the platform, and near the stern end of the raft, a broad flagstone is laid over the cross-pieces; and upon this the crew make a fire and cook their food, as occasion and convenience require.

The larger balzas carry between 400 and 500 quintals, or 25 tons, of merchandise without damage by proximity to the water; for the waves of the sea never sweep over the balza, neither does the water splash up between the beams, and the balsa always follows the motion of the water.

But the greatest singularity of this floating vehicle is, that it is sailed, tacked, and worked in contrary winds with the facility of a vessel with a keel, and it makes but little lee-way. This advantage it derives from another method of steering than by a rudder, viz. by guaras, or thin boards, three or four yards in length, and half a yard in breadth. These are placed

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vertically, both in the head and stern, between the main beams; and the crew, by thrusting some of them deep in the water and raising others, bear away, luff, tack, lie-to, and perform all the other motions of a regular ship.

A guara being thrust downwards in the fore part of the balza causes it to luff or keep nearer the wind; and by taking it out and dropping one astern, the balza bears away or falls off.

Such is the method used by the South American Indians in steering the balza; and sometimes they use five or six guaras, to prevent the balza from making lee-way—the guaras performing the office of lee-boards, such as are used in Dutch vessels and English sailing-barges.

The method of steering by these guaras is so easy and simple that, when once the balza is put in her proper course, one only is made use of, raised or lowered as occasion requires; and thus the balza is always kept in her intended direction. Balzas are tacked and wore by means of these guaras with a degree of precision truly wonderful.

Near each end of the central trunk of the balza, there is cut a perpendicular slit, about two inches wide by one or two feet in length. Through these the two principal guaras are worked up and down, as occasion requires; and they may be thrust down to a depth of ten or twelve feet, or drawn up entirely.

When it blows hard, and the balza is sailing with a side wind, several guaras are kept down, to make the raft hold a better wind and sail faster.(1)

Peruvian Balsas.

The balsas employed on the south coast of Peru are famed for their excellent capabilities as surf boats. They are of tubular and twin construction, and are used for crossing the surf off the coast of Mollendo. Capt. Hall (2) describes them

(1) *Vide* 'Relacion Historica del Viage á la América Meridional hecho del órden de S. Mag.,' &c., Impresa del órden del Rey en Madrid (1748). Ulloa's 'Voyage to South America.' Hall's 'Fragments of Voyages and Travels.'

(2) 'Journal written on the Coasts of Chili, Peru, and Mexico,' by Captain Basil Hall (1824).

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Peruvian Balsa.

as being made of two entire seal-skins inflated,(1) placed side by side, and connected by cross-pieces of wood and strong lashings of thongs; over all, a platform of cane mats forms a sort of deck, about four feet wide and six or eight feet long. At the fore part, the person who manages the balsa kneels down, and, by means of a double-bladed paddle (which he holds by the middle, and strikes the water alternately on each side), sweeps it along though the heavy breakers and surf on the coast. The passengers or goods are placed on the platform behind him.

The buoyancy and twin form of construction of these balsas enable them to cross the surf in safety, and without wetting the passengers, at times when an ordinary boat would inevitably be swamped. All sea-borne goods destined inland at this part of the coast are landed in this manner. The great bars of silver, and the bags of dollars also, which are shipped in return for the merchandise landed, pass through the surf on these tender t..ough secure conveyances, which are sometimes laden with a cargo of a ton or more in weight.

(1) Inflated buffalo hides are still used in India, on the banks of the Sutlej and Beas rivers, for crossing the rapid currents of those rivers, and conveying passengers and baggage to and from the shore. See 'Travels in Ladâk, Tartary, and Kashmir,' by Lieutenant-Colonel Torrens, p. 62; where see, also, description and engravings of these singular contrivances, and the mode of using them.

The late Lord Elgin, in his tour through the Western Himalayas, crossed over the Sutlej at Bejoura, with his retinue, on inflated skins—the usual way of crossing at the Bejoura ferry. These inflated skins were said to be precisely similar to those described by Xenophon and Arrian. See the *Times*, December 14, 1863.

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They can keep the sea in any swell or surf, in the hands of the natives, but are slow in their progress through the water, on account of their spare length.(1)

The Montaria of Brazil.

For short excursions, and for fishing in still waters, a small boat, called *montaria*, is commonly used in Brazil. It is made of five planks: a broad one for the bottom, bent into the proper shape by the action of heat, two narrow ones for the sides, and two small triangular pieces for stem and stern. It has no rudder: the paddle serves for both steering and propelling.

The montaria, in some parts of Brazil where the natives lead a semi-aquatic life, as on the creeks and canoe-paths of the rivers Amazon and Para, takes the place of horse, mule, or camel of other regions.

Mr. Bates says (2):—'It was interesting to see the natives in their little heavily-laden montarias. Sometimes they were managed by handsome, healthy young lads, loosely clad in straw hat, white shirt, and dark blue trousers, turned up to the knee. They steered, paddled, and managed the varejaõ (the boating pole) with much grace and dexterity.'

The manner in which the natives construct a montaria is as follows:—Having chosen a suitable tree, of the kind called Itaũba amarello, for the shell of the boat, they fell it, and shape out of the trunk a log about nineteen feet in length, which they then drag from the forest to the shore with ropes of tough lianas, cut from the surrounding trees. The log is then hollowed out with strong chisels through a slit made down the whole length. The heavy portion of the task being thus completed, the opening or hollow has to be widened, two planks have to be fitted to the sides, and the same number of semicircular boards for the ends, the benches have to be made, and the seams caulked.

(1) 'Travels in Peru and Mexico,' by. S. S. Hill (1860).

(2) 'The Naturalist on the River Amazon,' by H. W. Bates (1863), vol. i. p. 74.

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The expansion of the log thus hollowed out is a critical operation, and not always successful; many a good shell splits under the operation, or is spoilt by expanding irregularly. The log or shell is first reared on trestles, with the slit downwards, over a large fire, which is kept up for seven or eight hours, the process requiring unremitting attention, to avoid cracks and make the plank bend with the proper dip at the two ends. Wooden straddlers, made by cleaving pieces of tough elastic wood, and fixing them with wedges, are inserted into the opening, their compass being altered gradually as the work goes on, but in different degrees, according to the part of the boat operated upon. The casca takes a long time to cool, and it is kept in shape whilst cooling by means of wooden cross-pieces. (1)

The Igarité of Brazil.

Besides one or more montarias, almost every family has a larger canoe, called igarité. This is fitted with two masts and sails, a rudder, and keel; and has an arched awning or cabin near the stern, made of a framework of tough lianas, thatched with palm leaves. In the igarité they will cross stormy rivers fifteen or twenty miles broad. The natives are all boat-builders. It is often remarked by white residents that an Indian is a carpenter and shipwright by intuition.(2)

The Cuberta of Brazil.

Another kind of canoe used on the Amazon is called cuberta. This vessel is of about six tons burthen, of a square structure, with the floor above the water line, and an arched covering over the hold. It is also fitted with two masts and sails; and there is considerable room aboard for stowage of goods, sleeping-places, &c. (3)

Canoes of the Tocantīins and River Mojū.

These canoes are roughly made, but in some respects convenient, having a tolda—or palm-thatched roof, like a gipsy's

(1) 'The Naturalist on the River Amazon,' vol. ii. p. 117.
(2) Ibid. vol. i. p. 76. (3) Ibid. vol. ii. p. 72.

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tent—over the stern, which forms the cabin; and in the fore part, a similar one, but lower, under which the provisions and baggage are usually stowed. Over this is a rough deck of cedar boards, called the jangada, where the men work at the oars, and travellers take their meals, and smoke, when the sun is not too hot. These canoes have two masts and fore and aft sails, and are about twenty-four feet long by eight wide. (1)

Some of them must be well made and sea-worthy, for Mr. Wallace says:—A little above Barra the river is from six to ten miles wide; 'and when there is much wind, a heavy sea arises, which is very dangerous for small canoes.' In parts, it appears, and indeed 'for several hundreds of miles, the two banks of the river can never be seen at once: they are probably from ten to twenty-five miles apart.' (2)

Zangada or Catamaran of Pernambuco.

The Brazilian fishermen of Pernambuco, South America, use a sailing-raft or catamaran, called a jangada (or zangada), of most curious and interesting contrivance, as will be seen from the engraving. The zangada is composed of six solid logs of wood, lashed and secured together so as to form a raft, the ends, fore and aft, being trimmed underneath to give them the appearance of slightly turning upwards. Three stools, or raised thwarts, are permanently fixed across the logs at the aft part of the raft, the highest of which is the seat of honour and place for conducting the navigation of the raft.

There is a low thatched house, also standing upon wooden legs, fixed to the logs which compose the raft. This little place is only large enough for the crew to creep in as a shelter from the weather, or for the purposes of taking rest when on the sea at night.

The zangada is sailed under a triangular sail, of lateen shape (see the engraving), and is steered with a large-bladed oar. The sail is placed in an elevated position, so that it swings clear of the roof of the house.

(1) 'Travels on the Amazon and Rio Negro,' by A. R. Wallace (1853).
(2) Ibid.

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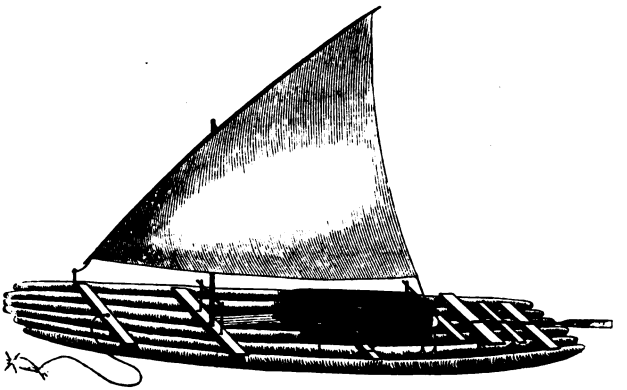

Zangada or Catamaran of Pernambuco.

On these remarkable catamarans the Brazilian fishermen fearlessly put to sea when fish are to be caught, whatever the state of the weather. When close-hauled in a fresh breeze, they sail at the rate of five or six knots an hour, and much faster when going free.

It appears that there are a numerous fleet of these catamarans at Pernambuco. The author of a recent work of much interest(1) states that, on entering the harbour at Pernambuco, he found the sea outside the entrance to the harbour 'dotted with lateen-sailed jangadas or catamarans, and the proprietors of these dancing-rigged rafts seemed literally at sea on a log.'

The zangada anchor is a most primitive contrivance, composed of pieces of wood, forming a sort of frame-work, encasing a large stone, as shown in the engraving.

A complete model of a zangada, with sail, anchor, and other fittings, may be seen in the United Service Museum, from which model the above engraving has been made.

(1) 'Brazil and the Brazilians,' by Revs. D. P. Kidder and J. C. Fletcher (1857).

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AMERICAN RACING VESSELS.

'By heaven, it was a glorious sight,
When the sun started from the sea,
And in the vivid morning light
The long blue waves were rolling free!'

AYTOUN.

THERE can be no doubt that some of the fastest boats and yachts that have ever contested in English sailing matches have come from America. It is quite matter of history that, in the year 1851, a famous schooner yacht, named the 'America,' was sent across the Atlantic by members of the New York Yacht Club, and arrived at Cowes on July 31 in that year, to compete at our regattas on the Solent with the fastest yachts of the Royal Yacht Squadron; and, in fact, she was challenged to sail a match with any yacht that might be chosen to compete with her.

The 'America' shortly afterwards was entered among a fleet of seventeen English yachts, and on August 23 in that year sailed in the memorable match of the Royal Yacht Squadron Regatta, when no less than fifteen started, seven of which were schooners of large tonnage and eight were cutters—the fleet comprising the fastest and most celebrated English clippers of the day. In this, her first race in English waters, the 'America' proved victorious, and carried off, with great triumph, the prize Cup of the Royal Yacht Squadron.

In several subsequent matches with chosen yachts of our pleasure fleet, she was also eminently successful, and proved herself an invincible clipper.

The yacht 'America' was, in fact, the wonder of her day, and was frankly admitted to be without a rival in this country. The sensation created at the time in the yachting circles by her marvellous powers 'on a wind,' and repeated victories, will not soon be forgotten.

It was observed at the time that the way in which the 'America's' sails were set evinced a superiority in the cutting which our sail-makers would barely allow; but certain

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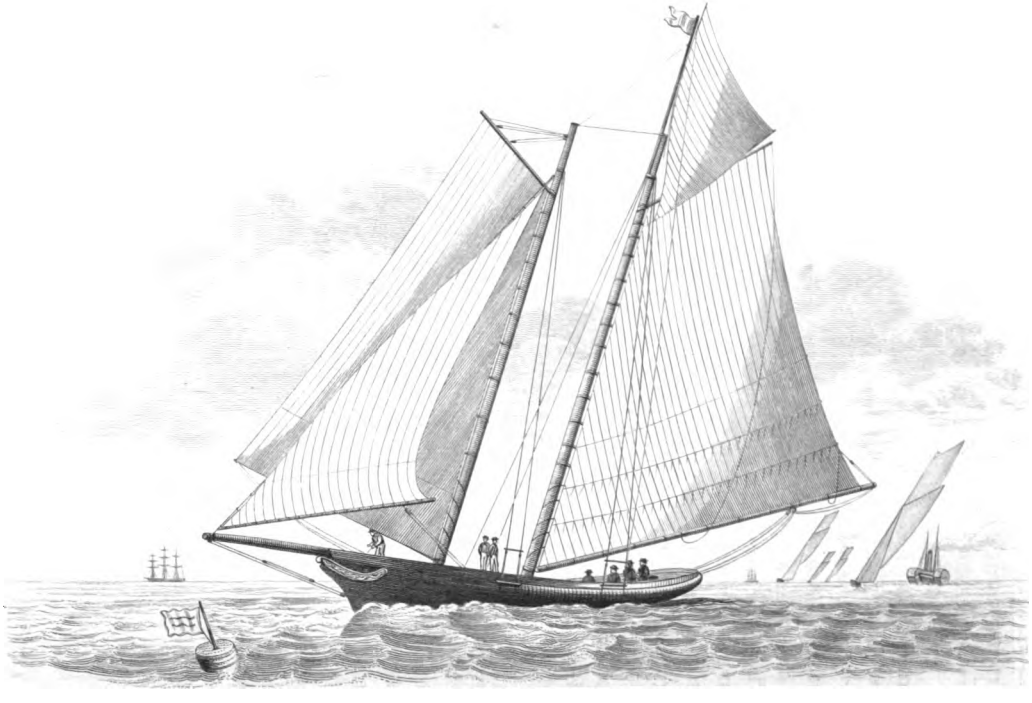

AMERICAN SCHOONER YACHT.

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it is that, in the matches sailed in English waters, while the jibs and main-sails of her antagonists were bulging out under pressure of the wind, the 'America's' were as flat as a sheet of framed card-board.

No foam, but rather a water-jet, rose from her bows; and the greatest point of resistance appeared to be about the beam, or just forward of the main-mast. While the cutters were dashing through the water, sending the spray over their bows, and the schooners were wet up to the foot of the fore-mast, the 'America' glided buoyantly over the waves, and her deck was as dry as when she first started.

The engraving on the opposite page represents the 'America' with her sails goose-winged, as she appeared on passing up the Solent at the Royal Yacht Squadron Regatta, August 23, A.D. 1851.

During the second year (1852) of her career in English waters, the 'America' was beaten on two or three occasions by English yachts; but these matches were sailed in light winds. Moreover, the American crew, who had come with her from America, had returned home, and the yacht had changed hands, having become the property of an English nobleman.

This remarkable vessel, which was about 170 tons admeasurement, had many peculiar and interesting features, both in form and rig. The workmanship of the hull and deck were excellent; and on the outside, particularly under the water-line, all was as smooth as glass—in fact, she had probably been rubbed with sand-paper. Her main breadth was well aft, or rather abaft the main-mast and above the water-line. Her bow was exceedingly fine and beautiful, very long and sharp, and concave even under the water-line, but flaring out considerably up to the level of the deck, above which it was slightly convex. With such a bow (under pressure of sail), this vessel, instead of forcing up a laboured mass of foam, like a cauliflower-head, gracefully ploughed up a light feathery foam, more like that of a Thames river steamboat of superior construction; and this easy gliding manner was one of her most striking characteristics, for up to the date of her appearance in English

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waters we had no sailing-yacht which bore the least resemblance to the 'America,' so far as her bow was concerned, though hundreds have since copied it, or attempted to do so, and as many have failed in the attempt. The aft-deck of this vessel was very broad, and below that very flat; she had rounded quarters, but her water-lines, aft, were sharp. In fact, every part of her below the water-line was fine, sharp, and more or less hollow; in these respects she differed *in toto* from our English yachts of that period. Her bulwarks were not above ten inches high, and inclined inwards (i. e. in nautical language, 'tumbled home'), or towards the deck; they were very solid, being much thicker than the planking of which the vessel was composed, and the upper edge of the bulwarks was bevelled off on the inside upwards from the deck. There was also a break in her deck of about six inches, nearly midway between the masts: this break, or opening, was said to be of great service in freeing the deck from water in heavy seas. There was a circular cock-pit aft, between three and four feet deep, for the steersman and a few passengers, and the gangway to the cabin led out of the cock-pit. Her accommodation below was perhaps inferior in many respects to the comforts usually found aboard an English yacht of so large a tonnage.

Her masts were two beautiful sticks, of immense size and height, so that they actually looked quite out of proportion, and made the hull and deck appear small, and they were stepped with considerable aft-rake. There was a small topmast fitted to the main-mast, but none to the fore-mast; the mast-heads were both very short, and the main-mast was rather longer than the other. The main-boom worked on a goose-neck, very low down—in fact, close to the deck; the boom appeared long, aft, on account of the absence of counter and overhang at the stern. She had also a boom to the fore-staysail which worked in a goose-neck at the end of her bumkin, or standing bowsprit. Both her gaffs were short and stout. In light winds a jibboom was run out, and a jib set when the wind was free. Neither main-sail nor fore-sail had much peak; they were fitted to wooden hoops at the upper

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part of the masts, but from the bonnets or second reefs downwards they were simply laced to the masts. On the gaffs there was a sort of wooden batten, by way of jack-stay, with holes in it, to which the main and fore-sails were laced. The tack of the main-sail and fore-staysail were each fastened down to the goose-neck of their respective booms by means of a bolt, and the main-sail was hauled out aft by a traveller on the boom. When under way, the main-sail and fore-staysail were each laced to their booms by lines, like reef-knittles. The fore-sail had no boom when working to windward, but was boomed out on the opposite side when running before the wind. The fore-sail and fore-staysail were fitted with bonnets, which were required to be taken off on shortening sail. The sails were all made of cotton canvas, of a particularly close and soft manufacture, and were cut and made up in such a manner that, when fairly set, they stood as flat as a board; so that it was observed by many persons on viewing her from the land, on the weather bow, that her sails were so completely covered by the masts that not a particle of canvas was visible. There was, in fact, an entire absence of any kind of bulging in the sails, and the gaff was exactly parallel with the boom. Under such sails, the 'America' was enabled to lay half a point nearer the wind than any other vessel that competed with her. When going free she used, occasionally, a small main-gafftopsail, a jib, and maintopmast-staysail. As to her standing rigging, each mast had two small shrouds on each side; but, when at sea, she carried other and stouter shrouds, and also stays from the main-mast to the fore-channels. It appears that she also carried, on crossing the Atlantic, a preventer-shroud to the fore-mast, spread out by a spar across the deck, and set up to stout eye-bolts fitted to the side of the vessel a little above the water-line. The back shrouds had broad solid wooden channels. She had small chain bumkin-shrouds and a chain bobstay, all set up by means of screws. Her fore-stay went over the foremast-head with an eye, and led through the bumkin end, and was set up on its own end to a long iron link, which passed through the stem. An iron rod was nippered to the stay, about ten feet from the eye, and led to

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the top of the fore-mast, by way of a stay, to strengthen the foremast-head, and to bear the strain of a triatic stay, which led from the top of the fore-mast to that of the main-mast, and was set up on its own ends to eyes in the masts. She also carried a small stay from the top of the fore-mast to the maintopmast-head, but no topmast back-stays. As to the running rigging, there was nothing very peculiar about it, except that the main-sheet was fitted with a contrivance like a railway buffer, in order to ease the strain in jybing.

Such is an outline of most of the numerous peculiarities of this famous yacht, which, both in build and sails, possessed qualities for racing and sailing superior to those of any English yacht of her time—qualities that, in a measure, were due to the beautiful form and symmetry of her hull, and the peculiar cut of her sails, which stood like boards; for on a wind, all her standing sails being laced to booms, they were capable of being brought into one continuous line with the keel, thereby reducing the angle between the luff of the sail, or weather-leech, with the keel to a minimum, which enabled the vessel to lie as near to the wind as her velocity through the water would admit. And another thing—she had a false keel, but her gripe was cut away, and a considerable amount of flat dead-wood surface was given aft, with deep draft of water, to enable a great spread of canvas on the main-mast to be carried near the maximum point of resistance, the vessel being balanced by their means, and the tendency to fly up in the wind or to gripe negatived. The great depth of keel and dead wood aft is considered a feature of immense importance in the construction of American racing vessels, unless they are built with a centre board.

It should be observed that it was 'on a wind' the 'America' showed such unquestionable superiority. When running before the wind, many of her competitors were enabled to 'hold their own' with her.

A year or two after the victories of the yacht 'America,' a smaller craft was sent over from New York, in the shape of a centre-board boat,(1) which also proved a perfect clipper

(1) *Supra*, page 86.

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among our small racing yachts, since which time the 'Una' and others have come over from our Transatlantic brethren, and competed with our English boats with similar success.

The form and rig of the 'America,' and also of the centre-board boats, were afterwards extensively adopted in England; and very considerable improvements have been made in the build, rig, and sails of English yachts and pleasure-boats since the errors pointed out to us by our American friends.

New York Pilot-Boats.

These far-famed vessels are said to be the best sea-boats and fastest clippers of the American waters. It was from the models and upon the principles of the New York pilot-boats that the celebrated yacht 'America' was built and rigged; her model, sails, and other distinguishing peculiarities were in direct imitation of those powerful boats—the only variation being that the bow of the 'America' was drawn out rather finer and longer than those of the others.

The New York pilot-boats are employed on those parts of the coast of the United States where the seasons are alternately very fine and very rough, so that their sea-going qualities are frequently and well tested. The general easy swell along the American sea-board gives the sharp build of the pilot-boat a greater advantage than it would have in the shorter sea of the English Channel; while the frequency of gales and the liability to sudden squalls on the American coast renders the fore-and-aft rig of the pilot-boat the easiest to be handled. They vary in size from 50 up to 150 tons, are schooner rigged, long and low in form, with round sterns and sharp hollow bows, their greatest breadth of beam being just before the main-mast.

The general complement of canvas which they carry is main-sail, fore-sail, and stay-sail; but in light winds they use a large flying-staysail, which is set from the top of a short main-topmast to the head of the fore-mast, and sheeted home half-way to the deck.

In very strong winds and heavy seas, they sail under a close-reefed fore-sail only, and yet they shoot ahead and glide past

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large and swift-sailing vessels with apparent ease. They are constantly at sea, looking out for vessels requiring the aid of a pilot.

In fine weather, smooth water, and light winds, these boats skim over the blue waters of the Atlantic with all the grace and ease of light fairy-like pleasure-boats.

CANADA.

Birch-Bark Canoes.

'He hollow'd a boat of the birchen bark,
Which carried him off from shore;
The wind was high and the clouds were dark,
And the boat returned no more.'

T. Moore.

The Canadian birch-bark canoes are ingeniously and beautifully constructed, and are a credit to the industry and skill of the inhabitants of the country which produces them. They are also remarkable for the material of which they are composed, and for their extreme lightness and buoyancy, matters of great importance in the navigation of rivers abounding with rapids, cataracts, and other obstructions. The whole of the outside, or planking, consists of the bark of the American birch-tree—a material tough enough in its nature, if carefully employed, but easily ripped or injured when coming in contact with hard substances.

The Iroquois Indians are the most expert makers of the birch-bark canoes. The largest are called 'North Canoes,' some of which are thirty-six feet in length by about six in breadth. These are propelled, with paddles, by a crew of sixteen men (besides a bowman and steersman), who, by the short quick stroke, drive the canoe along at the rate of eight miles an hour when going with the stream.

The bowman is the chief navigator; he 'fends off' at the bow with his pole when running rapids, and directs the crew as to the paddling of the canoe. These boats are sometimes

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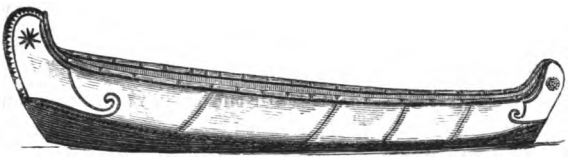

Canadian Birch-Bark Canoe.

sailed when the wind is free, but not otherwise. Small sails only are used, for they are tender under sail, and require very careful management.

The birch-bark canoes are used for travelling through the wild and unsettled parts of North America; voyages of nearly one hundred miles per day are sometimes performed in them. In a canoe of this kind the Governor of the Hudson's Bay Company used to perform his annual trip to the Red River settlement. They were also formerly used by the old 'North-West Company,' for the purpose of conveying the peltrie (i.e. firs) from inland parts, and as far north as Hudson's Bay to Montreal.

The smallest of the birch-bark canoes are about twelve feet long; these may be carried by one man, and are what are termed 'light hunting canoes.' They are also used as postage canoes. But even the largest of the birch-bark canoes are so light that they are often carried on the shoulders several miles by four men.

In building the birch-bark canoe, a skeleton is first made of light wood; the casing or planking of bark is then put on —not lengthwise, like the streaks of an ordinary boat, but transversely, passing under the boat and ending at the gunwales—the broadest strips being placed amidships. The bark is sewn together with the fibrous roots of the fir-tree, and the seams are well dressed with the gum of the balsam-tree. When they become leaky, the place is stopped by warming the gum, and plastering over it a thin piece of birch bark.

The bark of which these canoes are made is stripped from the birch-tree in winter, the largest trees affording the most useful bark. The canoes are also sometimes trimmed and strengthened with wicker wreaths, and ribs or timbers of

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cedar, which are almost as light as cork. The wicker wreaths are about as thick in substance as a silver crown-piece, but the birch bark is as thick as two crown-pieces, and the cedar ribs as thick as three or four. On the inside of the boat a rim or gunwale of tough wood is fitted, and the top ends of the cedar ribs are enclosed in it. (1)

It should be observed that these canoes have neither stem nor stern-piece, but run to a point at both ends. Neither have they keels; and nails and pegs are not used in the whole structure.

The lightness, and easy transport of these boats overland, is a great advantage in Canada, where the navigation of the rivers is continually interrupted by cataracts, waterfalls, and shallows.

A full-sized Montreal bark canoe, from which the above engraving was made, was exhibited in the International Exhibition of 1851, and described as made from the bark of the white birch, and as one of the largest class of canoes used in the north-west country. Previously to its being forwarded to England, it made a voyage in the spring of the previous year of upwards of 3,000 miles, with a crew of twenty men and their stock of necessaries and provisions.

Being exceedingly light, part of the crew are enabled to carry one of these canoes, when it is essential to avoid the falls and rapids; and, for months together, the birch-bark canoe forms the home, by night and by day, of the hardy and daring voyagers during their transit to and from the Far West. (2)

> 'Soon as the woods on shore look dim,
> We'll sing at St. Ann's our parting hymn,
> Row, brothers, row, the stream runs fast,
> The rapids are near and the daylight's past.' (3)

Birch-bark canoes are also used by the Sioux (who purchase them of the Chippeways) in gathering wild rice, which grows

(1) For a minute description as to the mode of building these canoes, see Peter Kalm's 'Travels in North America.'

(2) 'Exhibition Catalogue, 1851,' vol. ii.

(3) T. Moore, 'Canadian Boat Song.'

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about the rivers and lakes of the north country. The manner of gathering it is curious. One woman paddles the canoe, whilst another, with a stick in each hand, bends the rice over the canoe with one, and strikes it with the other, and so shells it into the canoe, which is constantly moving along until it is filled. (1)

They are also used for wild-fowl shooting, wild-fowl of all kinds being abundant in those parts; and as they feed and fatten on the rice, they are well worth the shooting, at certain seasons of the year.

Light Canoes of the River Ottawa.

'Where the wave, as clear as dew,
Sleeps beneath the light canoe,
Which, reflected, floating there,
Looks as if it hung in air.'

T. Moore.

These canoes are also made of birch bark, and are of the very lightest description, notwithstanding the heavy burthens they have to carry.

They are about thirty-six feet in length, sharp at each end, and about six feet in width at the broadest or middle part. The sheets of birch bark of which they are constructed are sewn together with vegetable fibre, and the seams gummed up close. The sides are strengthened and steadied by four or six cross-bars of wood, lashed to the rim of the canoe; and the inside is also protected by slender ribs of a light wood, but the bottom by only a few loose poles. They are called 'light canoes,' or *canots légers*, because intended to go swiftly, and to carry only provisions and personal baggage. The usual complement of a 'light canoe' is nineteen, that is, fifteen paddlemen and four gentlemen passengers, the latter sitting each on his rolled-up bed in the middle compartment of the canoe. (2)

(1) 'Letters and Notes of the Manners, Customs, and Condition of the North American Indians,' by George Catlin (1841).

(2) 'The Shoe and Canoe,' by J. J. Bigsby, M.D., &c. &c. (1850).

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Birch-Bark Canoes of South America.

The bark canoes of South America are formed of the whole unbroken bark of a tree, called *yga-ywera*. The natives take off the bark in one piece; then, keeping the middle straight and stretched by means of thwarts, they curve and contract the two ends by fire, and the boat is made. The bark is about an inch in thickness, and the canoe is commonly about four feet wide by forty in length. Some of them are capable of carrying forty persons, but the natives seldom proceed farther in them than half a league from the coast. In bad weather they land, and carry the canoe on their shoulders. (1)

Birch-Bark Canoes of Prince Edward's Island.

The birch-bark canoes of Prince Edward's Island are exceedingly well made. The interior, or skeleton, is formed of flat ribs of wood, a quarter of an inch in thickness, and an inch or more in breadth. These are placed nearly close together throughout the whole structure, and the bark is then put on outside, and laced or sewn together, the seams being well dressed with gum. There are no thwarts or benches, but five or six cross-pieces or stretchers at the top, as if to keep the canoe in shape. The top rim, or gunwale, is neatly worked with wicker. The paddles are small and short.

Birch-Bark Canoes of Nova Scotia.

The birch-bark canoes of Nova Scotia are also made of the same light material as the various other kinds of birch-bark canoes already described; but the form of them is different, as may be seen by the engraving on the next page.

Each side of the Nova Scotia canoe is made of one broad piece of birch bark, and so also is the bottom; the whole being strengthened on the inside with light strips of wood.

The interior of the canoe is bulged out amidships, but the ends of the two sides meet at stem and stern, where they are sewn together. The outer sides are curiously wrought with fancy work, woven in a variety of colours and fantastic designs.

(1) Southey's 'History of Brazil.'

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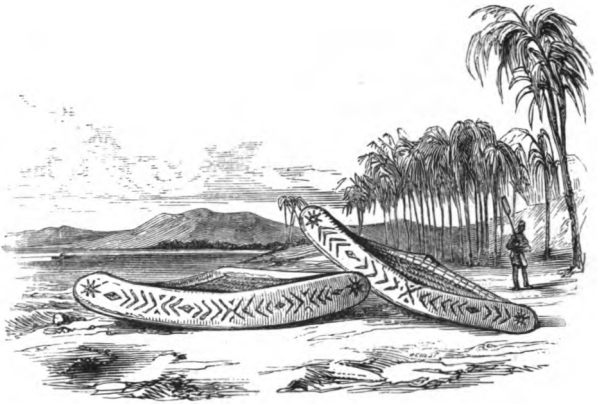

Birch-Bark Canoes of Nova Scotia.

The birch bark used in the workmanship of them on the outside very much resembles wicker, and appears to be worked in a similar manner. These canoes are no heavier than large wicker baskets. Light weight is an important consideration, as they have frequently to be taken out of the water and carried on the shoulders past rapids and other obstructions.

Those of New Brunswick are precisely similar to these.

Cedar Boats of the Willamette.

The cedar boats of the Willamette are built at Okonagan, and are somewhat after the model of a whale-boat, but much larger. They are constructed chiefly of the native cedar-wood; and are remarkable for their lightness and capacity, although capable of carrying three tons of merchandise, with a crew of eight men and a padroon; they may be carried easily on the shoulders by three or four of the crew, which is often necessary on passing over the portages.

These boats are clinker-built, and very strong and buoyant. The usual length is thirty feet, by five and a half feet in breadth, with a sharp bow and stern. The planks and gunwale are of cedar, and extend the whole length of the boat. They have no knees, but flat oak timbers are bolted to a flat keel, at

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distances each about one foot apart. The rowlocks are made of birch.

One very remarkable peculiarity in the construction of these boats is, that they are merely riveted at each end; and the seams being well dressed with gum of the pine-tree, they require no nailing or other kind of fastening. In case of accident, they are easily repaired, a supply of gum being always carried in the boat.

The crews who man these boats are chiefly Canadians, with the exception of about one-fourth, who are Iroquois Indians. When the wind is fair, they set a small square-sail, but they rely chiefly on their oars.

American Battoes.

Battoes (1) are a kind of flat-bottomed boat, much employed in Albany. They are used chiefly for carrying goods up and down the rivers, where the birch-bark canoes would be unfit, by reason of their slender and delicate construction.

Battoes are constructed of boards of white pine. The bottom is flat, in order to enable them to go with facility into shallow water. In form they are sharp at both ends, and somewhat lower amidships than fore and aft. The sides are almost perpendicular. They are of various sizes, from three to four fathoms in length, and about three feet six inches in breadth, and in depth from one foot eight inches to two feet.(2)

Canoes of Oregon Indians.

The canoes of the Oregon Indians, although made from the single trunk of a tree, are really of elegant form, with gracefully peering bows and stem, full midship section, and rather tapering stern, with a spring both fore and aft.

The interior is so carefully hollowed that the sides are only three-fourths of an inch in thickness, and the thwarts are ingeniously fitted to the interior, so as to prevent the sides from warping or getting out of shape.

(1) From the French *bateaux*.
(2) Kalm's 'Travels in North America.'

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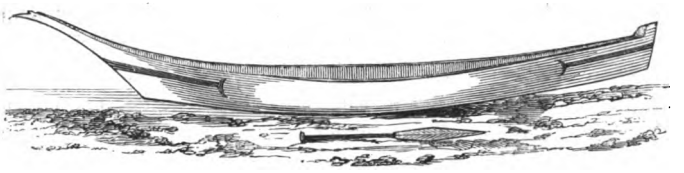

Canoe of Oregon Indians.

These canoes are preserved with great care, and when not in use are never allowed to lie exposed to the sun, for fear of injury. But where cracks and rents occur, they are repaired with much ingenuity. After boring holes on each side of the crack, small withes are passed, crossed, and pegged in such a manner as to draw the crack close. When the tying is completed, the whole is well dressed with gum of the pine-tree, and the damage is thus neatly and effectually repaired.

Vancouver's Island Canoes.

The canoes which Captain Cook met with at Nootka, in his 'Voyage to the Pacific,' he describes as 'well calculated for every useful purpose.' Many of them are forty feet long, seven feet broad, and about three feet deep; capable of carrying twenty persons or more, and formed of the trunk of a single tree.

From the middle, towards each end, they become gradually narrower, the aft part, or stern, ending abruptly or perpendicularly, with a small knob on the top; but the fore part is a protuberance stretching upwards, and ending in a notched point or prow, considerably higher than the sides of the canoe, which run nearly in a straight line. For the most part, they are without any ornament; but some have a little carving, and are decorated with seals' teeth, set on the surface like studs, as is the practice on their masks and weapons. A few have likewise a kind of additional head-piece or frame, like a large cut-water, which is painted with the figure of some animal. They have no seats, nor any other supports to the insides than several round sticks, little thicker than a cane, placed across at mid-depth. They are very light, and their

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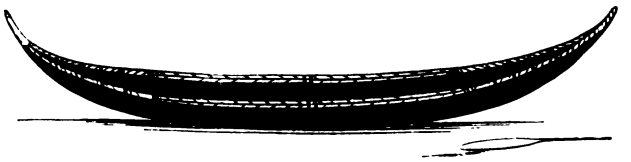
breadth and flatness enables them to float firmly without an outrigger, which none of them have—a remarkable distinction between the boats of all the American nations and those of the southern parts of the East Indies, and the islands of the Pacific. Their paddles are small and light, the shape in some measure resembling that of a large leaf, pointed at the bottom, broadest in the middle, and gradually losing itself in the shaft, the whole being about five feet long. The natives have acquired great dexterity in the management of these boats, and in the use of the paddles, sails forming no part of their art of navigation.



FUEGIAN CANOES.

THE canoes of the natives of Terra del Fuego are very curious.

They are constructed of bark, sewn together with shreds of whalebone, seal skin, and twigs.

The top rim, or gunwale, is formed by binding canes, or small poles, to the sides. The canoe is kept in shape by stretchers lashed across from one gunwale to the other; the two longest and strongest being placed amidships, across the top of the vessel.

They have no seats or thwarts: the occupants squat on some dried grass strewn about the bottom.

Frail as this canoe is, a fire is generally carried in the bottom (on a few stones and ashes), in the deepest part of the canoe, which always contains water and surrounds the fire. One person is generally employed in baling out the water and attending to the fire.

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The Fuegians 'seldom venture outside the kelp, by the aid of which they pull themselves along, and their paddles are so small as to be of little use in propelling their canoes, unless it is calm.'(1)

AUSTRALIAN BARK CANOES.

THE canoes which are employed by the natives on various parts of the coast of Australia are made of the bark of the large gum-tree, which has a thick and tough coating.

The manner in which these canoes are constructed is as follows:—The tree is first girdled; the bark is then slit to the size required for the canoe, and stripped from the tree with great care. The usual size is fourteen feet in length by seven in width.

The piece of bark thus peeled from the tree is then charred on the inside; each end is afterwards folded, joined, and fastened with cords and wooden rivets; a wooden stretcher is next placed crosswise amidships, and the canoe is then complete; and, although only three feet wide in the broadest part, will convey six persons.

The paddles employed are of different sizes and lengths—from two to five feet; when the short ones are used, one is taken in each hand.

These canoes are seldom seen without a fire, which is made on a layer of gravel in the middle of the boat. In this custom the natives resemble the Fuegians. The canoes of the latter, however, far excel those of the native Australians.

ARCTIC REGIONS.

GREENLAND BOATS.—THE OOMIAK.

THE boats chiefly used by the Greenlanders are of two sorts—the Oomiak (or umiak), which is specially for females, and is called the woman's boat; and the other, the Kaiak, or

(1) Wilkes' 'American Exploring Expedition,' vol i.

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kajak (also sometimes spelt 'kayak'), is exclusively the men's boat; the lightest and smallest kajaks are the boats they use in their seal-hunting, fowling, and fishing exploits.

The umiak is considerably the larger boat of the two, and is commonly from twelve to twenty feet in length, and of a proportionate breadth and depth, varying from four to six feet in width, and from two and a half to four feet in depth. Umiaks are all flat-bottomed; the prows and sterns of some of them are sharp and pointing upwards; others are bluff, or even square, and have two projecting arms at each end, like a bier, only pointing upwards.

The form and construction of the umiak is very singular. It is made of slender laths, about two inches broad, fastened together crosswise with whalebone, and covered over with tanned (1) seal skins. The bottom consists of three main beams; the principal one runs up the middle of the boat, as a keelson, and the others, one on each side, are bent so as to meet at each end.

Upon these three main beams some thin cross-pieces are laid and morticed. They then fix stout timbers, or ribs, to the outer beams, and secure them at the top to the gunwale, and also to a second or lower beam, to which the rowing-benches are attached; and in this manner a good strong framework is got up, though all are secured with wooden rivets and whalebone bands. Indeed, they decline to use iron nails, because they would rust and fret the holes in the skins. It is not too much to say of the ingenuity of these people, that they perform their work with considerable mechanical skill and neatness. They use neither rule nor square, but with the eye alone mete out the due proportions. The only tools they use are a little lock-saw, a chisel (which, when fastened to a wooden haft, serves also for a hatchet), a small gimlet, and a pocket-knife. When the skeleton of the boat is completed, the men's work is done, and the women commence theirs, by covering the whole with newly-dressed seal skins, which are as soft and pliable as chamois leather; and they caulk the

(1) The natives understand the art of tanning, and are able to dress their skins very fairly with a mixture of oil and colouring.

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seams with old grease, and finish off their work in a neat and proper manner, making the boat perfectly water-tight. In truth, these boats, with careful handling, are not so liable to leak as wooden ones.

They are always taken out of the water when not in use, and when in the water the stitches swell as soon as wetted, and fill up any slight leakage which, when dry, might exist. If they accidentally touch upon a stone on the shore, and so rip a hole in the boat, they directly do it up by patching a piece of soft seal skin over the place; but they handle their boats with so much care, that they are seldom injured through carelessness or neglect. Almost every year they renew the outer covering of the boat.

Lieutenant Hooper, in his 'Arctic Boat Expedition in Search of Sir John Franklin,' mentions having often made use of these oomiaks; and with reference to one which he purchased, he observes:—'We purchased an oomiak (woman's or family boat), made of two walrus skins sewed together, and stretched tightly over a light wooden frame, with paddles complete. Its price was a large butcher's knife, a looking-glass, and a quantity of tobacco and beads.'

'She differed much in shape from those of the Tuski, which are a little wider at top than bottom. This one measured thirty-seven inches at the greatest breadth of floor, and forty-three where widest between the gunwales; a species of keel was formed by carrying the woodwork to an edge below.'

'Workmanship was displayed in the manufacture of her frame which would not have disgraced a skilful carpenter; it was particularly neat and well fitted, which made it much stronger than its lightness would lead one to suppose.'

These boats (umiaks) are rowed and managed entirely by women, generally five to each boat, four of whom ply the oars or paddles, and one steers. The men never interfere in the management of the oomiak, except under very trying and peculiar circumstances.

The oars they use are short, but broad in the blade, and of a shovel-like shape; they are secured to their place on the

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gunwale by straps of skin. In fair winds they use a small square-sail, which they hoist from a mast they set up in the fore part of the boat; the sail is generally made of skins from the intestines of fish and animals. Some of the more wealthy, or trading Greenlanders, have sails made of white linen striped with red.

In boats of this kind the Greenland women sometimes perform voyages along the coast of many miles, carrying with them their tents, goods, family, and whole substance; but on these long voyages the men keep with them near at hand in their kajaks; and in heavy seas they attend the umiak very cautiously, sheltering it from the heaviest waves, and holding the gunwales to keep it upon a balance. They frequently travel as many as twelve leagues a day in these boats; and every evening, when they halt, they go ashore, unload their boats, and draw them to land, turn them upside down, and load the beams fore and aft with stones, that the wind may not blow them away. When they come to any difficult or impassable part of the coast, they carry the boat on their heads overland to more navigable water.

The Kajak (or Kaiak).

In this light little craft the Greenlander passes the greater part of his life, performs most of his ordinary and extraordinary sporting adventures, and thereby obtains a sustenance throughout the year for himself and family.

In appearance the kajak bears some resemblance to the wild-fowlers' gunning-punts of the eastern coast of England,(1) only the ends of the kajak turn up, which is not so in the gunning-punts.

The kajak is about eighteen feet in length, eight inches deep, and only sixteen or seventeen inches wide. It is built with a slender wooden keel, long side laths, with cross-hoops, not quite circular, bound together with whalebone, and covered over with fresh-dressed seal skins, as the umiak; only the leather encloses the frame like a bag, on all sides, over the top as well as the bottom. Both the sharp ends at the

(1) *Vide ante*, p. 93.

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head and stern are fortified with an edge of bone, and finished with a knob at the top, in order to protect it from damage when it touches against icebergs and rocks. In the centre of the kajak, on the top of the covering, is a circular hole formed with a rim or hoop of wood or bone, similar to the Esquimaux and Labrador canoes described (*infra*) at page 359. Into this hole the Greenlander slips, when about to proceed on his aquatic excursions. Having stretched his legs out under a covering, he finds a seat on a board covered with soft skin; and in that position the rim reaches just above his hips. He then tucks and arranges the lower part of his water-pelt, or seal-skin coat, so tightly round the rim of the hole that no spray or water can penetrate, though the waves should fly over him and well souse both the boat and outer garment of its occupant.

The coat is, at the same time, very closely folded and buttoned about his face, shoulders, and arms, with bone buttons.

On each side of the top of the kajak he places his lances, and secures them under straps of leather, affixed for the purpose. In front of him he places the running line for seal-hunting, rolled up on a small circular seat or platform purposely placed for it, and behind him he places the bladder.

His pautik, or double-bladed oar, is made of solid red deal, bound at each end of the blades with a thin plate, two or three inches in width; and it is further protected from the ice by the edges of the blades being inlaid with bone. The Greenlander uses the pautik after the same manner as the sweep, or double-bladed oar, is used in the Welsh coracle, but with great skill and precision of time. So equipped, he is enabled to propel his tiny boat with great velocity. He fears neither storms nor heavy seas; his kajak is as light and buoyant as a cork. When a wave strikes it abroadside, he balances himself and the boat with the pautik. And if he happens to be capsized (which is not an uncommon occurrence), by a peculiar and difficult muscular exertion, to which the Greenland lads are trained from their youth, he swings his body by aid of the oar, and rights himself and his kajak in a moment,

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though he be turned over with boat bottom upwards. He keeps fast hold of the pautik, for if he loses or breaks it in a strong wind or heavy sea, his chance is almost hopeless, if far from shore or assistance.(1)

Lieutenant Hooper, in his 'Ten Months among the Tents of the Tuski,' gives a very amusing picture of these remarkable little boats, and the skill and dexterity of the Greenland seal-hunters. He says:—

'Five men, who launched their tiny and beautiful kiacs, accompanied us for a while; the light vessels, propelled by a double-bladed paddle, dancing over the rippling waves, light as a gossamer, and keeping pace with us with perfect ease, although we were favoured by a light breeze, and used both oars and sail. Two of these men continued with us for a considerable time, and amused us greatly by their proceedings. They frequently darted their fish-spears, or harpoons, at imaginary prey, to demonstrate the mode of using them. These spears were about a yard long, of thin drift-wood, with double or triple barbs of ivory. They were thrown from a hand-board, into which they fitted in a socket, and had a bladder attached to them, to keep them afloat in the water, the hunter picking them up with great ease as he passed rapidly onwards in his canoe.'

Kajaks were also much used by Sir Leopold M'Clintock and his party, for the purposes of shooting and fishing, when in the Arctic regions; and it appears they are used by pilots, as well as fishermen and seal-hunters. It is stated in M'Clintock's narrative that, when passing Godhaven, the pilot was launched off the deck of the 'Fox' in his little kayak, without stopping the ship, and without the addition of a capsize—a feat which it would be difficult for an Englishman to perform in any boat of English construction.

M'Clintock also observes, with reference to these extraordinary little boats, and the manner in which they are managed, that when the 'Fox' was at anchor in the neighbourhood of Whalefish Island, watching an opportunity to

(1) *Vide* Scheffer, 'De Militia Navali Veterum.' M. Hassæus, 'D. Leviathan Jobi.' Crantz, 'Greenland.' 'Modern Voyages and Travels.'

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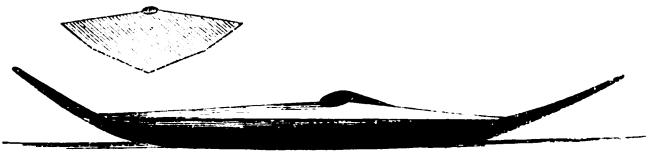
enter Godhaven, notwithstanding the hard-blowing weather, some natives came off in kajaks, about five miles from land, to the 'Fox'; the water washed over their little craft, and kept the kayakers' seal-skin coats streaming with wet. And he adds: 'This part of their dress seems rather part of the kayak, as it is attached to it round the hole in which the kayaker sits, so that no water can enter.'



Esquimaux Canoe and Section.

Esquimaux Canoes.

These very fragile boats are similar in many respects to the kajaks of the Greenlanders. They are made of seal and walrus skins stretched over a light framework of wood, and they are entirely covered over at the top, with the exception of a circular hole, higher at the back than in front, to admit the body of the occupant.

It would appear to be almost impossible for any kind of boat to be of lighter form, and they are propelled with great rapidity by the native Esquimaux, who use for the purpose a double-bladed oar, like the Greenlander's pautik.

Labrador Canoes.

There is a great similarity between these canoes and those of the Esquimaux, with the exception that they have not such high-peering ends at stem and stern as the latter have. In other respects they are nearly identical, being built in the same way, and with the same sort of materials. Some of them are large enough to carry two or three persons, a separate hole being formed in the top for each person.

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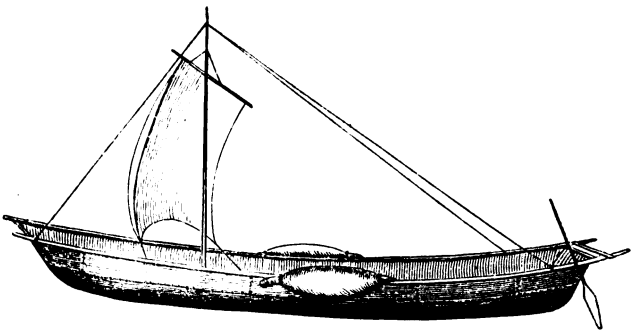

TCHUKTCHI SKIN CANOES.

These primitive canoes are, in fact, the counterpart of the Greenland 'oomiak.' The natives of Tchuktchi have no wood wherewith to build either huts or boats. Their tents, as well as their boats, are composed chiefly of a framework of the large bones of whales and walrus, covered over with skins of the walrus, seal, and reindeer, and yet both tents and boats are admirably constructed.

On each side of the skin canoe they usually fasten a seal-skin, blown out full of wind, with the ends firmly secured. These serve as floats, or safety-buoys, when the canoe heels over. (1)

Some of these skin boats are of large size, fitted with rudder, mast, and large square-sail, and capable of carrying two tons or more of merchandise. Even an ordinary-sized skin canoe will carry five persons, with tent, blankets, cooking utensils, provisions, &c. (2)

In the cold icy regions in which these canoes are employed, it is often absolutely necessary for one of the crew to stand at the bows with a pole, shod with iron, to push aside the masses of drift-ice and tangle of driftage which intercept the navigation. But with all, a skin boat has its advantages. The tough flexible skin will *give* for several inches without

(1) 'Travel and Adventure in Alaska,' by F. Whymper (1868), p. 89.
(2) Ibid. p. 196.

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necessarily tearing, and will stand more wear and tear than the cedar canoes of British Columbia.

Skin canoes, quite open, capable of containing twenty or more persons with their effects, and hoisting several masts and sails, are now frequently to be observed among both the sea-coast Tchuktchis and the inhabitants of Northern Alaska, and occasionally others which might be called 'full-rigged' canoes, carrying main, gaff, and sprit-sails; but these are probably recent and foreign innovations. (1)

A smaller sized skin-boat is used for the purposes of the chase, such as seal and walrus-hunting, and also for capturing the reindeer when driven or hunted into the water. These are light but very tough, being composed of walrus skins, which are beautifully prepared and sewn over a light frame-work of bone or wood. They are flat-bottomed, and nearly wall-sided, about three feet and a half in breadth at the widest part of the gunwales, and about two feet and a half below, decreasing in width at the ends, which are just wide enough to admit a man's body. The top rim is neatly worked over with strips of hide or whalebone. They are propelled with great speed by paddles, which are also used in bow and stern to direct their course. The smooth surface of the walrus skin offers little resistance to their passage through the water; and they are carefully preserved from any incrustation, being carried on shore when not in use, turned over, and beaten with stout sticks, to drive off the moisture and keep the skin in shape, as it would otherwise be liable to bag. (2)

Similar boats to these are used by some of the North American Indians, who cover the frames with seal skins, and stain them a cherry colour.

Boats of Kamtschatka.

The Kamtschatkans have two sorts of boats—one is called *koaihtahta*, and the other *tahta*. The former is very similar

(1) 'Travel and Adventure in Alaska,' p. 249.

(2) 'Ten Months among the Tents of the Tuski, with Incidents of an Arctic Boat Expedition in Search of Sir J. Franklin,' by Lieut. W. H. Hooper, R.N.

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to an English Peter-boat, except that the prow and stern are higher, and the sides lower. (1)

The tahta has the prow and stern of an equal height; the sides are not rounded outwards, as in most boats, but rather incline inwards at the midships; consequently they are very unsafe, and soon fill and swamp in rough water.

The Kamtschatka boats are built chiefly of poplar-wood.

Baidars.

The boats of the Kurilski Islands and Lopatka are called *baidars*. These are built with a keel similar to an English boat, with the exception that the planks are sewn together, and the seams are caulked with moss. The Kuriles have no proper wood for boat-building, except that which is washed ashore by the sea. In transporting their goods to and from these islands, they frequently lash two baidars together, and form a sort of bridge across them, in which way they carry them safer and drier. The northern inhabitants of Kamtschatka—the settled Koreki and Tchuktcha—for want of proper timber and plank, make their baidars of the skins of sea-animals stretched on poles.

AFRICAN CANOES.

The canoes of the inland Africans appear to be seldom sailed: they are chiefly propelled by paddles. Dr. Livingstone describes those of Bakoba as very primitive craft, hollowed out of the trunks of single trees by means of iron adzes; and if the tree has a bend, so has the canoe. The natives make fires in them, and prefer sleeping in them, while on a journey, to spending the night on shore. 'On land you have lions,' say they, 'serpents, hyenas, and your enemies; but in your canoe, behind a bank of reeds, nothing can harm you.' (2)

The fishing canoes of the Bakurutse he describes as simply large bundles of reeds tied together.

(1) 'History of Kamtschatka.' Translated by Dr. Grieve (A.D. 1764).
(2) Dr. Livingstone's 'Travels in South Africa.'

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Mr. Anderson also describes the reed raft as having sidings and uprights of the same material. There is also an engraving of it in his 'Lake Ngami.' It appears to be an ingenious contrivance, and, in localities where wood is scarce, answers the purpose admirably.

The chase of the hippopotami is also sometimes conducted on a large reed raft, capable of conveying six or eight men, and two small canoes. There is also an engraving of this remarkable contrivance in the same work.

One of the canoes in which Dr. Livingstone ascended the Loeambye he describes as thirty-four feet long, by twenty inches wide. This was propelled by six paddles, and it was not the largest size. Some of them had a crew of ten. They stand upright, and keep stroke with great precision, though they change from side to side as the course demands, the men at the head and stern being selected from the strongest and most expert. These canoes are flat-bottomed, and thereby enabled to go into very shallow water; and whenever the bottom can be felt, the paddles are used as setting-poles, to set the canoe along, instead of paddling. Dr. Livingstone's fleet consisted of thirty-three canoes and about 160 men.

African Bark Canoes.

On the Chikapa Dr. Livingstone met with some bark canoes which he describes as made out of a single piece of bark, sewed together at the ends, and having sticks placed in it at different parts to act as ribs. The word 'Chikapa' means 'bark,' or 'skin,' and the Doctor says that was the only river in which he saw this kind of canoe used.

African Hunting-Canoes.

These are very small, and can carry only two persons. They are made quite thin and light, and as sharp as English racing skiffs, being used chiefly for hunting the hippopotami and other animals in the water. (1)

(1) Dr. Livingstone's 'Travels.'

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Canoes of Lake Anegue.

The canoes used on the Anegue Lake are of a singular construction—quite flat-bottomed, very light draught, about fifty feet long, and not more than two feet wide; consequently they are ticklish craft. The oarsmen stand up, and use paddles seven feet long, with which they can propel one of these boats at a very good rate. But these canoes are very easily capsized, the gunwale being but a few inches above the water. They are not, however, very often tipped over, though the negro paddlers stand up at their work. (1)

Gelves.

These remarkably ancient style of vessels are used chiefly on the Red Sea. They are built entirely out of the cocoa-tree, which, on being sawn into planks, are sewn together with a kind of twine, which is spun out of the bark of the same tree, and also twisted into ropes and cables. The gelve, thus built, is tough and flexible; and if it chances to strike against a rock or run aground, it receives comparatively little or no injury, by reason of its peculiar construction enabling it to yield to the blow.

The sails of the gelve are made of the broad leaves of the cocoa-tree stitched together.

It has often been remarked, that out of the cocoa-tree alone a vessel of the Red Sea may be built, rigged, and fitted with mast, sails, cordage, and ropes; and victualled with bread, water, wine, sugar, vinegar, and oil.

(1) 'African Travels,' by M. Chaillu (1861).

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PART VI.

NAUTICAL VOCABULARY.

AFT, ABAFT, or ASTERN.—Towards the stern of a vessel.

A-LEE.—The side opposite to the wind; the situation of the helm when in an opposite direction to that from which the wind blows.

AMIDSHIPS.—Any part of the middle of a vessel with regard to her length and breadth.

ATHWART-HAWSE.—Across the direction of a vessel's head, under the bowsprit.

ATHWART-SHIPS.—Across a vessel from side to side.

A-WEATHER.—On the weather side, or towards the wind; the situation of the helm when in the same direction as that from which the wind blows—opposed to *A-lee.*

BACK-STAYS.—Ropes or stays extending from the mast-head to the sides of the vessel, abaft the mast.

BEAM.—The width of a vessel at the widest part.

BEAR.—To *bear-up* is to turn a vessel from the wind, by putting the helm up, or towards the quarter from which the wind blows. To *bear-down* is to pursue a vessel from a windward quarter.

BEARINGS.—The lower part of a vessel, or that which is below the water line when in proper trim.

BECKET.—A short piece of rope, with a loop at one end and a knot at the other, used for confining a spar or rope in a convenient place.

BELAY.—To make a rope fast to a cleat by two or more turns without hitching it.

BEND.—To make fast: to *bend a sail* is to attach it to the mast or yard by lashings or otherwise.

BERTH.—A sleeping apartment aboard a vessel. A safe anchorage is termed a good berth.

BIGHT.—A noose or folded part of a rope: any part may be called the bight, excepting the ends.

BILGE.—The protuberant part of a cask; the breadth of a vessel's bottom, or that part on which a vessel rests when lying aground on her side.

BINNACLE.—A box containing a mariner's compass.

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BITTS.—Perpendicular pieces passing through the deck on each side the heel of the bowsprit; the cable is generally made fast to the bitts, if there is no windlass.

BOARD.—The distance a vessel goes upon any one tack when beating to windward. The mast of a vessel is said to go by *the board* when it snaps off and falls over the bulwarks. To *make a good board* is to sail a long distance in a straight line when close-hauled. To *make short boards* is to tack frequently.

BOBSTAY.—A small chain or rope used to keep the end of the bowsprit down.

BOLSTERS.—Pieces of soft wood tacked on each side of the mast above the cheeks, on which the eyes of the shrouds rest.

BOOM.—A spar used to spread the foot of a main-sail.

BOOM-REST.—A shifting iron of the same shape as an iron rowlock, in which the outer end of the boom is laid when the sails are furled.

BOWLINE.—A rope used in square-rigged vessels for holding out the leech when sailing close-hauled. Sailing on a bowline is when the wind is on the quarter and the sheet is not close hauled.

BOWSE.—To pull or haul on a rope or a tackle.

BOWSPRIT-SHROUDS.—Ropes on each side for protecting the bowsprit.

BRAILS.—Ropes connected with the throat of a sail, by which the canvas is drawn up close to the mast or yard.

BREAKERS.—Waves of white spray denoting shallow water; also a small cask containing water.

BRIDLE.—A rope is called a bridle when the two ends are made fast to the leeches or yard ends of a sail.

BROADSIDE.—The side of a vessel lengthwise.

BULK-HEAD.—A temporary partition separating different parts of a vessel.

BULL'S-EYE.—A piece of wood the shape of a block, but with a hole in the centre for a rope to reeve through, and without a sheeve; also a thick piece of glass for a cabin light.

BULWARKS.—The boarding round the sides of a vessel above the deck.

BUMKIN, or BOOMKIN.—An iron for setting out the fore-sail or mizzen beyond the boat's stem or stern.

BUM-BOATS.—Are those which attend alongside vessels with provisions, fruit, &c.

BUNTING.—Woollen stuff for making flags.

CABLE.—A large rope for holding a vessel at anchor. A ship's cable is usually 120 fathoms, or 720 feet, in length.

CARRY AWAY.—To break a spar or rope.

CARVEL-BUILT.—A vessel is carvel-built when the planks are laid in smoothly, and not lapped over, as in clench, or clincher-built vessels.

CAT-HEADS.—Strong timbers projecting from the bows of vessels, to which the anchor is secured when heaved up.

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CAT'S-PAW.—A very light current of air occasionally felt during a calm.

CAULK.—To fill the seams of a vessel with oakum.

CHANNELS.—Strong pieces of wood attached to a vessel's side, to which the shrouds or rigging are secured.

CHEEKS.—Small carved projections on each side the mast, upon which the tressel-trees rest.

CHINSE.—To fill the deck seams with oakum, and serve them over with melted resin.

CLAMP.—A mast-clamp is an iron for securing a boat's mast to the thwart.

CLENCH or CLINCHER-BUILT.—When the planking of a vessel is lapped over, similar to weather-boarding.

CLEAT.—A small iron or wooden pin for belaying ropes to.

CLEW.—The lower corner of a square-sail, and the after or outer corner of a fore-and-aft sail. To *clew-up* is to haul up the clew.

CLEW-GARNET.—A rope used in square-rigged vessels for hauling up the clew of a sail.

CLOSE-HAULED.—When the sheets are hauled in close, and the sail set as flat as possible.

CLOVE-HITCH.—(See *Knots, &c.* p. 135.)

COMPANION-WAY.—The staircase leading to and from the cabin.

CRANK or CRANKY.—Not stiff. A vessel is said to be crank when inclined to roll on her side, or when unable to carry much canvas.

CRINGLE.—A short piece of rope worked grommet-fashion into the bolt-rope of a sail, and containing a metal ring or thimble.

CROSS-TREES.—An iron or wooden piece secured to the mast above the cheeks, for steadying and spreading the topmast-shrouds.

CROWN.—To crown a knot is to pass the strands over and under, so as to form a crown above the knot.

CUDDY.—A small cabin in the fore part of a boat.

CUTWATER.—A sharp projection forward of the vessel's bows.

DAVIT.—A projection of wood or iron over a vessel's side with a sheave in the end, used for hoisting up boats. A *fish-davit* is a short spar. with a sheave in the end, used for fishing the anchor.

DEAD-EYE.—A small solid circular block, with three holes through it, for the lanyards of rigging to reeve through; they are used instead of blocks.

DEAD-WATER.—The eddy under a vessel's counter.

DOUBLE-BANKED.—When two rowers sit upon the same thwart.

DOUSE.—To lower a sail suddenly.

DOWN-HAUL or DOWN-HAULER.—A rope attached to the peak-end, or other top part of the sails, for hauling down.

DRAUGHT.—The depth of water required for a vessel to float in.

DRIVE.—To drift down a tideway or scud before the wind.

DRUM-HEAD.—The top of a capstan.

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EYE.—A loop in the end of a rope or stay.

EARING.—A rope attached to the aft-leech-thimble of a sail, for bending the sail to the boom-end, or for reefing purposes.

FENDER (or FEND-OFF).—A soft substance of rope or tow covered with canvas, used for hanging over the side of a vessel, to protect it from striking or chafing when alongside.

FID (or PHID).—A sort of thumb-cleat attached to a loop of cord or ratline; it is used for expedition in reeving through the thimbles of ropes and sails, as for holding the fore-sheets to the clew of the sail.

FISH-DAVIT.—(See *Davit.*)

FLUKES.—That part of an anchor which holds in the ground, forming the arms and flat triangular tips.

FORE-AND-AFT.—From stem to stern. A fore-and-aft rigged vessel has no square-sails.

FORECASTLE (pronounced 'foaks'l').—A small cabin before the mast, in the bows of a vessel; called in yachts, the galley.

FORE-REACH.—To pass a vessel when close-hauled and on the same tack.

FORE-GRIPE.—An additional piece secured to the lower part of a vessel's stem.

FOUNDER.—To fill with water and sink.

FRAP.—To pass a lashing round a sail to prevent it from blowing about.

FULL-AND-BY.—Sailing close to the wind without shaking any part of the sails.

FURL.—To roll up a sail close to the yard and secure it with lashings.

GAFF.—The top spar of a cutter's main-sail.

GALLEY.—A long-shaped boat; also the forecastle aboard a yacht.

GAMMON.—An iron hoop or ring by the side of a vessel's stem, through which the bowsprit is run out.

GANGWAY.—An opening in a vessel's bulwarks, for convenience of getting from the vessel to a boat.

GARBOARD-STRAKE.—The strake or planking of a vessel nearest the keel on each side.

GASKETS.—Pieces of plaited yarn, used for lashings when the sail is furled.

GOOSE-NECK.—An iron joint connecting the boom with the mast.

GOOSE-WINGED.—A term applied to schooners or vessels with two masts when running before the wind with sails boomed out on each side.

GORES.—Angles at one or both ends of such cloths as increase the width of the sail; goring-cloths are sometimes added when a sail is required with a narrow head and wide foot.

GRAPNEL.—A kind of anchor, with four or more claws or barbs, used for securing the earings of fishing nets when spread in the water.

GROMMET.—A rope ring, much used in boats and ships; it is formed by laying round a single strand of rope (see engraving, p. 135).

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GROUND-TACKLE.—Consists of anchors, cables, &c.: anything used for anchoring and securing a vessel at anchor.

GUNTACKLE-PURCHASE.—A rope working through two single-blocks.

GUNWALE, or GUNNEL.—The inside piece leading from stem to stern on each side the boat, and to which the top strake is nailed.

GUY.—A rope for steadying a spar or boom, and for keeping it in its place.

HALLIARDS, HALYARDS, or HAULYARDS.—Ropes or tackles used for hoisting and lowering sails.

HATCHWAY.—The opening in a vessel's deck, leading to the cabin or hold.

HATCHES.—Shifting boards fitting over the hold of a vessel.

HAWSER.—A large rope for securing a vessel either at anchor or otherwise.

HEAD-SAILS.—Sails used before the mast, as fore-sail and jib.

HEAVE-SHORT.—To heave the vessel close up to, or over the anchor, by drawing in the cable.

HEAVE-TO (see *Lay-to*).—To haul the fore-sail to windward, so that the vessel makes little or no headway.

HELM.—The tiller or wheel by which a vessel is steered.

HOLD.—The interior of a vessel, where the cargo is placed.

HORNS.—That part of the gaff to which the trucks are attached, and which fits close to the mast; also called *Jaws*.

HOUNDS.—The shoulders at the mast-head, where the tressel-trees rest.

HOUSED.—The top-mast is housed when lowered down and secured at the heel by a lashing.

HOUSING-LINE.—A small cord used for seizings.

HULL.—The body of a vessel.

JAWS.—Gaff-ends hollowed out to fit the masts. (See also *Horns*.)

JIB.—A triangular sail set out on the bowsprit.

JIB-BOOM.—A spar rigged out beyond the bowsprit.

JIGGER.—A small tackle for hoisting or hauling.

JUMPER-STAY.—An iron bar used in vessels with two masts, connecting one with the other at the top.

JURY-RIG.—A temporary rig when a mast is carried away. A temporary mast is called a jury-mast.

JYBE.—To shift a boom sail from one side of a vessel to the other.

KEDGE-ANCHOR.—An anchor with a shifting stock.

KELSON, or KEELSON.—A strong piece running the whole length of the vessel, and to which the keel is attached.

KEVEL-HEAD, or KEVEL.—A strong piece bolted to some part of the bulwarks, for belaying ropes to.

KNEES.—Bent pieces used in boat-building for holding the planks together.

KNIGHT-HEADS.—Strong timbers near the stem, on each side the bowsprit.

KNOT.—A mile as marked on the log-line.

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LANYARD.—A small rope, one end of which is made fast, whilst the other is used for securing anything to its place.

LARBOARD (now obsolete, *Port* being the term applied).—The left side of a vessel, looking forward.

LAY-TO.—(See *Heave-to.*)

LAY-ALOFT.—An order for some part of the crew to get up the rigging.

LEECHES.—The outer edges of sails, fore and aft.

LEAD-LINE (or SOUNDING-LINE).—A small cord, with a lump of lead attached, for testing the depth of water; termed by the Anglo-Saxons *Sund-gyrd.*

LEADING-WIND.—A free wind: when the wind is abeam, or nearly right aft.

LEE.—The opposite side to that from which the wind blows.

LEE-BOARD.—A board attached to the side of flat-bottomed vessels, which turns on a pivot, and is lowered when the vessel is going to windward: it is intended to answer the purpose of a keel.

LEE-WAY.—The distance lost by a vessel drifting from the wind.

LEEWARD.—From the wind, the opposite to windward.

LIST.—To lay on one side by the pressure of the wind upon the sails.

LOG-BOOK.—A journal kept aboard ship, as to working the vessel, winds, weather, distances, &c.

LOG, LOG-LINE, and LOG-SHIP.—Used for regulating and ascertaining the rate at which the ship sails.

LOGGERHEAD.—A block with a small neck and larger head, for making ropes fast to.

LUFF.—To bring the ship near to the wind by putting the helm *down*; the fore-leech of sails.

LUFF-TACKLE.—A purchase comprising a double and a single block.

MARLINE.—A kind of spunyarn; small soft stuff used for lashings.

MARLINSPIKE.—A wooden or iron pin gradually tapering to a sharp point: used for splicing ropes, and various other purposes.

MIDSHIPS.—The middle or broadest part of a vessel.

MISS-STAYS.—When the helm is put down, and the vessel fails to come about to the other tack.

MIZZEN.—A mizzen-mast or mizzen-sail is a small mast or sail abaft the main-mast.

MOORING.—Securing by two anchors placed in different directions.

MOUSE.—To tie a small spunyarn round the hollow of a hook, to prevent it from slipping off.

NEAP-TIDES.—Small or low tides, occurring at the middle of the moon's second and fourth quarters.

NOCK.—The upper end forward of a boom sail.

OAKUM.—A sort of tow, made by picking old rope to pieces.

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OFFING.—Distance from shore.

OUTHAULER.—A rope used for hauling out the tack of a jib or the clew of a boom sail.

OUTRIGGER.—A spar for spreading an extra sail beyond the hull of the vessel. A boat with projecting rowlocks. Also a weight suspended over a vessel's side.

OVERHAUL.—To examine: to slack a rope through a tackle, by letting go the fall, and pulling on the leading parts.

PAINTER.—A rope secured in the bows of a boat, and used for making fast to a ship or otherwise.

PALM.—A sailmaker's thimble.

PARCELLING.—Winding tarred canvas round a rope, to prevent its chafing.

PARRAL (or PARREL).—A band of rope, or collar, for securing a yard to a vessel's mast at its centre.

PAZAREE.—A rope secured to the clew of a fore-sail, and leading through a block on the boom; used for guying out when scudding.

PAWL.—An iron bar for securing the windlass or capstan from turning back.

PAY-OFF.—To haul the jib or fore-sail aweather, for the purpose of turning the vessel's head from the wind. To *Pay-over*: to cover with pitch or tar. To *Pay-out*: to slack out a cable from the vessel.

PEAK.—The upper aft corner of a main-sail.

PENDANT (or PENNANT).—A long narrow streamer carried at the mast-head. A *swallow-tailed pennant* is called a *broad pennant*, and is only hoisted by the commodore of a club or fleet.

PINTLE.—An iron bolt belonging to a rudder.

PORT.—To port the helm is to put it to the left, or contrary way to starboard.

PORT-HOLE.—A small opening in the bulwarks for pointing cannon.

PURCHASE.—A mechanical power applied to ropes rove through blocks, where extra power is required.

QUARTER.—A term applied to that part of a vessel's sides which extends from the main channels to the stern.

QUARTER-DECK.—Applied to large vessels; that part of a vessel's upper deck abaft the main-mast.

RATLINE.—A kind of rope ladder formed across the shrouds by means of a small line, called ratline.

REACHING.—Sailing on a side wind.

REEF.—To reduce a sail by tying up the reef-points.

REEF-EARINGS.—Ropes attached to the reef-thimbles of a sail.

REEVE.—To pass a rope through a block or sheave-hole.

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RIGGING.—A general term applied to shrouds, stays, and other ropes of a vessel. *Running-rigging* applies to such ropes as lead through blocks, and can be altered at pleasure. *Standing-rigging* applies to shrouds and stays which seldom require hauling down or slacking.

RING-TAIL.—A light studding-sail set abaft the main-sail, by a yard slung from the gaff-end.

ROACH.—The fore-leech of a sail which appears to draw by the pressure of the wind.

ROLLING-TACKLE.—An extra tackle for steadying sails in a heavy sea.

ROWLOCKS.—A rest for the oars of a boat to work in.

RUN.—The hollow or narrow part of a vessel's stern.

SCUD.—To run before the wind in a gale with little or no sail.

SCULL.—To propel a boat by means of a single oar at the stern. A *Scull*: a small oar.

SCUPPERS.—Openings in the lower part of a vessel's bulwarks for the water to run off the deck.

SCUTTLE.—A small hatchway. To *Scuttle*: to bore holes in a vessel's bottom, for the purpose of sinking her.

SCUTTLE-BUTT.—A cask kept on deck, from which the water is taken for daily use.

SEIZE.—To secure by means of small stuff called seizings.

SELVAGEE.—A strong neat strap made by marling several rope yarns together.

SERVE.—To wind small marline or spunyarn round ropes to prevent chafing.

SERVING-BOARD.—A small board or mallet for winding taut and putting on the service stuff.

SHACKLE.—An iron link, with a shifting pin, for connecting chains together.

SHEAVE.—The roller or wheel in a block on which the rope runs.

SHEAVE-HOLE.—A hole in a spar or block for a rope to reeve through.

SHEER.—The line of plank under a vessel's gunwale.

SHEET.—A rope attached to the aft clew of a sail, by which it is worked from one side to the other.

SHEET-ANCHOR.—The largest anchor a vessel carries.

SHROUDS.—Ropes for protecting the mast, leading from the mast head to the sides of the vessel.

SKY-SCRAPER.—A light triangular sail, used in large ships, properly called a sky-sail; it is set above the royal.

SKEET.—A scoop with a long handle, used for wetting sails.

SNATCH-BLOCK.—A single-block, with a hole in its side, for the bight of a rope to reeve through.

SNORTER.—A small rope strop, into which the heel of a spreet is set.

SPENCER.—A sail used in schooners, set on the fore-mast, with gaff, but no boom.

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SPLICE.—To join the ends of two ropes by interweaving the strands.
SPRING-A-LEAK.—To commence leaking.
SPRING-A-LUFF.—To force a vessel closer to the wind.
SPREET.—A light spar for setting a sprit-sail.
STANDING-RIGGING.—Shrouds and other ropes made fast and not very often requiring alteration.
STARBOARD.—The right-hand side of a vessel, looking forward.
STAY.—A rope for protecting the mast. *To stay*: to tack a vessel, or put about. *In stays*: the situation of a vessel at the instant of tacking, when all sail is shaking in the wind's eye.
STAY-SAIL.—Implies a sail set upon a stay.
STEERAGE.—That part of the vessel (between decks) forward of the cabin.
STEM.—The fore piece of a vessel, and to which the two sides are united.
STERN-BOARD.—The back motion of a vessel moving stern foremost.
STERN-POST.—That to which the rudder is fixed; the extreme end aft of a vessel.
STERN-SHEETS.—The aft part of a boat, abaft the rowers, intended for passengers.
STEVE.—The angle of a bowsprit when raised more or less from the horizontal.
STIFF.—An essential quality in the hull of a sailing-vessel, which enables large sails to be used in safety, or without causing the vessel to list on one side.
STRAND.—A yarn, or number of yarns, twisted together.
STRIKE.—To strike the mast is to lower it down into the boat.
SWEEP.—A long oar of extra size, used in small sailing-vessels when becalmed, or requiring to be forced ahead.

TACKING.—Turning, or beating, to windward. To *Tack* is to put a vessel about by putting the helm a-lee, thereby bringing it round on another tack. The tack of a main-sail is the corner nearest the goose-neck.
TACKLE.—A purchase formed by a rope rove through a block or blocks.
TAFFRAIL.—The rail, or top-piece, leading round a vessel's stern, level with the side rail above the bulwarks.
TAIL-BLOCK.—A block with a rope spliced into, and hanging from, the end.
TARPAULIN.—Canvas rendered waterproof by being dressed with tar.
TAUT.—To haul tight.
TELL-TALE.—A compass suspended from the beams of a cabin.
THIMBLE.—A metal ring, with concave surface, used in sail-making, and for splicing into rope-ends when required.
THROAT.—That part of a sail where the brails catch and draw it close to the mast; the inner end of a gaff, near the *Jaws*.
THWARTS (properly *Athwart*).—All seats across a boat are so called.
TILLER.—The lever by which the rudder is moved.
TOPPING-LIFT.—A rope leading from the upper part of the mast to the outer end of the boom, and by which the boom is topped up, or raised.

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TRAVELLER.—An iron or metal ring, with a hook below and an eye at top. A *Traveller* leads up and down the mast or along a bowsprit, for keeping the sail close to the spar.

TRESSEL-TREES.—Strong pieces placed horizontally, and fore and aft of the mast-head, to support the cross-trees and top.

TRICE-ROPE.—A rope used for hauling up the main-tack.

TRICE-UP.—To haul up the main-tack by means of the trice-line.

TRIM.—To arrange the ballast, or cargo, in the most advantageous manner. To *Trim* a sail, to set it in the best and most effective position with regard to wind.

TRUCK.—The flat circular piece, on the very top of the topmast-head, through which signal-halliards are rove.

TRYSAIL.—A fore-and-aft sail, set with boom and gaff at the main-mast of a brig; also a small extra-stout gaff-sail used for cutters in a gale.

TYE.—A rope belonging to a boat's yard, with a hoisting tackle at one end.

UNBEND.—To untie, to cast off.

UNDER WAY.—A vessel is under way when moving through the water by the action of the wind upon the sails.

UNSHIP.—To take out of a vessel; to remove out of its place.

VEER.—To turn a vessel from the wind and bring her round on another tack.

WAIST.—The middle part of a vessel's deck, between the quarter-deck and forecastle.

WAKE.—The track of a vessel in the water.

WALES.—Strong planks in the upper part of a vessel's sides, running the whole length fore and aft.

WARP.—A strong rope for securing a vessel.

WASH-BOARDS.—Shifting boards attached to the gunwales of boats for preventing the water from washing into the boat in a rough sea.

WEATHER-BOARD.—That side of a ship which is to windward.

WEATHER-HELM.—A vessel carries a weather-helm when the tiller requires to be slightly inclined towards the windward, to keep the vessel on her course and prevent her from flying into the wind.

WEIGH ANCHOR.—To draw the anchor up from the bottom.

WHIP-PURCHASE.—A purchase formed by a rope rove through a single-block. To *Whip*, to secure the end of the rope from unravelling by winding twine round it.

WORMING.—Winding cord, or marline, spirally between the strands of a rope, to give it a neat appearance.

YARD.—A spar, tapering at each end, for spreading a lug or square-sail.

YOKE.—A top-piece, fitting on a boat's rudder, with lines attached for steering: it is used chiefly for rowing-boats, instead of a tiller.

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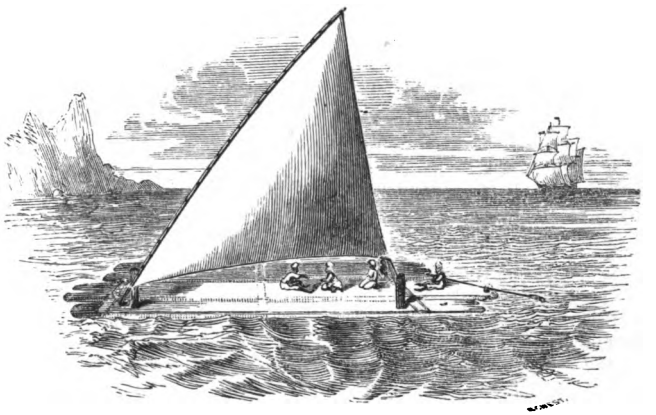

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